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Used Oil and Its Regulation in the United States

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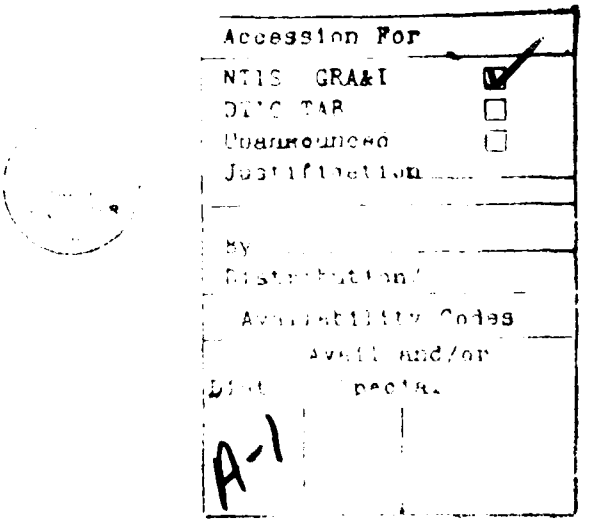

I. INTRODUCTION

On November 29, 1985 the Environmental Protection Agency (EPA) took the first significant steps toward the federal regulation of waste and used oil by: (1) promulgating the final rule for the "Burning of Waste Fuel and Used Oil Fuel in Boilers and Industrial Furnaces;"[1] (2) proposing a rule to establish standards for used oil which is recycled;[2] and (3) proposing a rule to amend the regulations for hazardous waste management under Subtitle C of the Resource Conservation and Recovery Act[3] (hereafter referred to as RCRA) by listing used oil as a hazardous waste.[4] These efforts by EPA are particularly interesting because of both the nature of the prodding from Congress it took to obtain EPA action and the unprecedented volume, degree, and breadth of public opposition these actions generated once taken. The proposed listing of used oil as a

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[1] 50 Federal Register (hereafter FR) 49,164 (November 29, 1985), "Hazardous Waste Management System; Burning of Waste Fuel and Used Oil Fuel in Boilers and Industrial Furnaces," (Action: Final Rule.), (codified at 40 C.F.R. Parts 261, 264, 265, 266, and 271).

[2] 50 FR 49,212 (November 29, 1985), "Hazardous Waste Management System; Recycled Used Oil Standards," (Action: Proposed rule.).

[3] RCRA was created in 1976 by Public Law (P.L.) No. 94-580, 90 Stat. 2795, and amended in 1980 and 1984: Used Oil Recycling Act of 1980, P.L. No. 96-463, 94 Stat. 2055; Hazardous and Solid Waste Amendments of 1984, P.L. No. 98-616, 98 Stat. 3221 (codified as amended at 42 U.S.C. sections 6901-6991i (1982 and Supp. III 1985)).

[4] 50 FR 49,258 (November 29, 1985), "Hazardous Waste Management System; General; Identification and Listing of Hazardous Waste; Used Oil," (Action: Proposed rule.).

hazardous waste evoked particularly severe and widespread public opposition.

The early efforts to "prevent degradation of the environment from the disposal of waste oil"[5] began to take form in the early 1970's when Congress recognized that the disposal of used oil could pose a threat to the environment through potential groundwater and stream contamination. In response to these concerns, Congress in passing the 1972 Federal Water Pollution Control Act mandated that the Administrator of the EPA conduct a study of the generation, biological effects, and potential market for waste oil. The mandated report[6] was submitted to Congress in April 1974. It helped to emphasize the extent of the waste oil problem by reporting: (1) that of the 1.1 billion gallons of waste lubricating oils produced in 1972, the fate of 340 million gallons was uncontrolled disposal; (2) the collection and proper utilization of such oils can be a valuable source of fuel and lubrication products; (3) the industry for the proper utilization of such oils is very small and highly susceptible to economic fluctuations; (4) indiscriminate disposal of waste oil is potentially detrimental to the environment, however more study is needed to determine the toxic effects which may result; and (5) that (at the time) the need for further regulatory action at the federal level is not clear despite the fractionated state of the collection,

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[5]See the Federal Water Pollution Control Act (commonly known as the Clean Water Act, P.L. 95-217), 33 U.S.C. section 1251 et seq. at section 1254(m).

[6]U.S. EPA, Report of the Congress, "Waste Oil Study," authorized by section 104(m), P.L. 92-500 (April 1974). This report is available in the RCRA docket of the EPA Headquarters, Washington, D.C.

re-refining and disposal system. The report also recommended that the progress of those states which had begun waste oil regulatory programs be monitored to determine the benefits and costs of such programs and that these state efforts should be encouraged.[7]

Continued concern led to the authority to regulate recycled oil in the Used Oil Recycling Act of 1980[8] (hereafter referred to as UORA). Section 7(a) of this act amended Subtitle C of the Solid Waste Disposal Act to require the Administrator to "promulgate regulations establishing such performance standards and other requirements as may be necessary to protect the public health and the environment from hazards associated with recycled oil." The provision also required the Administrator to study the economic impact of such regulations on the oil recycling industry and to "ensure that such regulations do not discourage the recovery or recycling of used oil."[9] Section 8 of this act required a report to Congress of the Administrator's "determination as to the applicability to used oil of the criteria and regulations promulgated under subsections (a) and (b) of section 3001 of the Solid Waste Disposal Act relating to characteristics of hazardous wastes." The report[10] which was delivered to Congress on January 16, 1981, contained a detailed study of the hazards of such oils and stated

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[7] Id. at pages vii-viii, and 1-2.

[8] P.L. 96-463, Oct. 15, 1980, 94 Stat. 2055.

[9] Id. at section 7(a).

[10] U.S. EPA, Report to Congress, "Listing Waste Oil as a Hazardous Waste," January 16, 1981, prepared by the Office of Solid Waste, as required by section 8(2) of the Used Oil Recycling Act of 1980 (P.L. 96-463).

that "The Agency believes that all of these considerations support the listing of used automotive and industrial oils as toxic (T) hazardous wastes."[11]

In the 1984 Hazardous and Solid Waste Amendments[12] (hereafter referred to as "the 1984 Amendments") to RCRA, Congress significantly revised these provisions to emphasize that EPA's main goal, with respect to used oil, is "the protection of human health and the environment."[13] The 1984 Amendments also required the EPA to determine whether to list used oil as a hazardous waste[14] and specified management standards for recycled oil.[15]

Further details of these acts and their effects will be provided in this paper's analysis of federal efforts to regulate waste and recycled oil presented in Chapters V and VI.

The cautious nature[16] of each of these directions from

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[11] Id. at page 77.

[12] P.L. 98-616, November 9, 1984, 98 Stat. 3258-60.

[13] 42 U.S.C. 3014(a), The original version of the Used Oil Recycling Act of 1980, (P.L. 96-463) section 7(a) stated "The Administrator shall ensure that such regulations do not discourage the recovery or recycling of used oil." The 1984 amendments to RCRA (P.L. 98-616) added the condition to this mandate that these regulations will also be "consistent with the protection of human health and the environment."

[14] 42 U.S.C. 3014(b).

[15] 42 U.S.C. 3014(c)(2)(A) states, "[T]he Administrator shall promulgate such standards under this subsection regarding the generation and transportation of used oil which is recycled as may be necessary to protect human health and the environment."

[16] In particular the breadth of the studies required by section 9 of the Used Oil Recycling Act of 1980 reflects the fears of Congress concerning the regulation of used and recycled oil without adequate

Congress to the EPA were a prediction of the unprecedented public and industry reaction to the November 29, 1985 proposals of EPA for "Management Standards for Recycled Oil Facilities" (50 FR 49213-49258) and the proposed "Identification and Listing of Hazardous Waste; Used Oil" (50 FR 49258-49270). In response to these proposals and the March 10, 1986 supplemental notice[17] EPA received approximately 850 public comments and extensive testimony.[18] The commentators included a number of trade associations, state environmental agencies, and environmental groups. The great majority of the comments opposed aspects of the proposal, particularly the proposed listing of recycled oil as a hazardous waste.[19] A brief summary of these comments provided in the November 19, 1986, notice of the EPA's "Decision not to adopt

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study. In addition Congress demonstrates caution by providing EPA with authority to regulate recycled oil under Subtitle C of RCRA (42 U.S.C. section 3014(a)) without the requirement that it be identified or listed as a hazardous waste. See also H.R. Rep. No. 198, 98th Cong., 1st Sess. (69).

[17] 51 FR 8206 (March 10, 1986) "Hazardous Waste Management System; Identification and Listing of Hazardous Waste", (Action: Notice of data availability and request for comments.).

[18] Draft Final Report of the "Public Comment Analysis for the Listing of Used Oil and Management Standards for Recycled Oil," prepared for the Waste Treatment Branch U.S. EPA by Versar Inc., P.O. Box 1549 Springfield, Virginia. Available in the RCRA docket Headquarters U.S. EPA.

[19] Statement of Dr. J. Winston Porter, Assistant Administrator for Solid Waste and Emergency Response, U.S. Environmental Protection Agency before the Subcommittee on Energy, Environment and Safety Issues Affecting Small Business of the Committee on Small Business, U.S. House of Representatives, H.R. Hearing, 99th Cong. 2d Sess., May 19, 1986, Hearing on "Used and Recycled Oil: Pending Rulemaking."

proposed rule" stated:

> Most of these comments criticized the proposals, especially the proposed listing of used oil as a hazardous waste. The ultimate thrust of the negative comments was that the listing would not only discourage used oil recycling, but would ultimately be environmentally counterproductive because used oil left unrecycled would be disposed of in manners posing greater risk that recycling. Additionally, although many commenters supported, in general, the need for regulation of used oil (including management standards for recycled oil), some commenters indicated that certain of the proposed management standards would also discourage recycling. Particular negative factors singled out by commenters were the stigmatizing effect of a listing, and strict regulation of burners who have an easily-available virgin fuel substitute.[20]

Before an analysis of the regulatory efforts of waste and recycled oil can be effectively undertaken, it is first necessary to understand the nature and use of these products along with the management system which has evolved in the United States to deal with these substances. Therefore, in order to develop an understanding of the general and specific difficulties confronting regulatory efforts in this area, the following sections will address: (1) the source and nature of these substances; (2) the general and specific problems associated with certain aspects of the complex and fragile used oil management system; (3) the recovery and

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[20] 51 FR 41,900 (November 19, 1986), "Identification and Listing of Hazardous Waste; Used Oil," (Action: Decision not to adopt proposed rule; tentative schedule to address issues still outstanding.), at 41,900.

recycling industries which have evolved to deal with this potential resource; (4) the potential environmental impact of waste oil; and (5) why regulatory efforts in this area have such great potential for damaging the resource recovery efforts and the environment.

II. WASTE OIL PRACTICES IN THE UNITED STATES

(a) Terminology of the Industry and Regulatory Efforts

In order to examine the waste oil management system it is first necessary to establish the terminology of the industry and the associated regulatory efforts. The primary source of statutory definitions is the result of the UORA, section 3 which was codified in RCRA, section 1004 (36-39) and provides:

> (36) The term 'used oil' means any oil which has been--
> (A) refined from crude oil,
> (B) used, and
> (C) as a result of such use, contaminated by physical or chemical impurities.
> (37) The term 'recycled oil' means any used oil which is reused, following its original use, for any purpose (including the purpose for which the oil was originally used). Such term includes oil which is re-refined, reclaimed, burned, or reprocessed.
> (38) The term 'lubricating oil' means the fraction of crude oil which is sold for purposes of reducing friction in any industrial or mechanical device. Such term includes re-refined oil.
> (39) The term 're-refined oil' means used oil from which the physical and chemical contaminants acquired through previous use have been removed through a refining process.[21]

These definitions provided the basis for terms used in numerous contract studies and regulatory efforts by EPA; however, additional breakdown of several other stages and processes that oil products

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[21] 42 U.S.C. 6903(36-39)

can go through in their life cycle is necessary to adequately deal with the subject in these studies and in any discussion of the industry. In 1987 the U.S. Department of Energy produced a study[22] summarizing the research to date on waste oil issues and provided definitions for the following commonly used terms:

> (1) Unused (virgin) oil--a refined petroleum product containing significant quantities of alkyl, naphthenic, and aromatic hydrocarbons. The oil may also contain additives to improve its lubrication, wear, oxidation, and corrosion characteristics.
> (2) Unused waste oil--unused virgin oil that becomes contaminated when it is spilled, or is mixed with other wastes, or when it fails to meet specifications.
> (3) Used (waste) oil--a petroleum- or synthetically-derived oil whose physical and chemical properties have changed such that it cannot be used for its original purpose. The contamination can result either through use or subsequent mismanagement and depending upon the impurities, the oil may or may not be economically recyclable.
> (4) Waste oil--oil which becomes contaminated during storage, handling, and use. It is made up of both used and unused waste oils.
> (5) Oil reclamation--the application of mild and/or severe cleaning methods to waste oil to remove contaminants. Some of the common methods used include settling, heating, filtration, dehydration, distillation, and centrifuging. The product is called reclaimed or recovered oil. [Generally the term reclamation covers all forms and types of processing or treatment activities (including re-refining) whereby usable materials such as fuels are recovered from waste oil.]

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[22] Mueller Associates, Inc., "Waste Oil: Technology, Economics, and Environmental, Health, and Safety Considerations," Contract No. DE-AC01-84PE72013, prepared for the U.S. Department of Energy, Assistant Secretary for Environment, Safety, and Health, Office of Environmental Analysis, January 1987.

(7) Oil reprocessing--the process of producing a fuel or fuel supplement from used oil by the application of mild cleaning methods such as settling filtration, centrifugal separation, and sometimes, heating.
(8) Oil re-refining--the process of cleaning and upgrading waste lubricating oil to produce a high quality base oil; the base oil is then blended with additives. The product of this process is called re-refined lubricating oil.[23]

These additional terms are to be used only for the following discussion of the used oil industry and are not applicable to subsequent statutory and regulatory analysis, since each statutory and regulatory effort produces its own unique version of the categories and subcategories of the universe of waste oil being dealt with.

(b) Data and Information Problems for Industry Study

Although numerous reports and studies have been produced in recent years in an attempt to analyze the waste oil industry, very little documented information on used oil collection, reprocessing, and reuse actually exists. This is due to the unstructured nature of the industry and the lack of governmental recordkeeping requirements for used oil collection, reprocessing and reuse.[24]

During the early 1980's the EPA contracted with Franklin

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[23] Id. at 2-3.

[24] Id. at 3; See also Irwin and Liroff, "Used Oil Law in the United States and Europe," prepared for the Office of Research and Development, U.S. Environmental Protection Agency, Contract No. 68-01-2203, July 1974.

Associates Ltd. to produce a report[25] summarizing the information which had been acquired by the EPA over the period of 1981-1984. As with previous studies this report relied extensively on "best estimates" provided by telephone conversations and site visits for the data presented concerning the number of facilities generating and processing used oil, as well as the amounts of used oil generated and managed in various ways.[26] Overall the Franklin Associates' report is the most reliable and current data, at this time, on used oil generation.

Its approach to quantifying the flow of oil through the used oil management system was based on the flow of new oil through this same system. It began with 1983 sales and followed these oils through the system until they were ultimately reused, consumed, or disposed of in some manner, including uncontrolled dumping. Oils that were no longer sold, such as transformer oils containing polychlorinated biphenyls, or those comprising part of a different system, such as refinery tank bottoms and industrial process residues, were omitted from the analysis. In order to summarize waste oil composition they developed a series of fairly simple statistical parameters that characterized over one thousand used oil samples with respect to the presence and concentration of 19

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[25] Franklin Associates Ltd., "Composition and Management of Used Oil Generated in the United States," Report No. PB85-180297, for the U.S. Environmental Protection Agency, Washington, D.C., November 1985.

[26] Id. at Report Documentation page; and Mueller Associates, supra note 22, at 3-4.

potentially hazardous constituents.[27]

The results of this used oil composition methodology produced wide variances within the study itself and conflicts with several studies previously utilized.[28] This is noted not as a criticism but only to illustrate the extreme difficulties in obtaining data of sufficient accuracy and reliability upon which to both describe the industry and against which to assess regulatory efforts. This point also illustrated the problems involved for both the Congress and for the EPA in obtaining reliable data upon which to base statutory and regulatory efforts.

(c) A Brief History of the Used Oil Industry Prior to 1980

Oil recycling is not a new concept and can be traced back to re-refining activities as early as 1915.[29] From this early beginning the re-refining industry and the use of re-refined oil grew rapidly for almost half a century. By the 1960's the industry contained about 150 companies re-refining almost 300 million gallons of used oil per year, which was approximately 18 percent of the nation's demand for lube oil at that time. During the 1970's the industry rapidly dwindled to fewer than 20 companies producing under 100 million gallons of re-refined oil per year, which was less than 10 percent of the

[27] Mueller Associates, supra note 22, at 3-4.

[28] Id. at 4; see infra note 75.

[29] Waste Oil Recovery and Reuse, Information Transfer, Inc. 1974, at page 3.

nation's lubricant needs.[30] (The continued decline of the industry during the 1980's will be addressed in a later section.)

The reasons for this significant decline were the result of both market and regulatory forces. The first market shift was simply an increased demand for used oil for the purposes of road dust suppression and use as a fuel, both of which are less environmentally desirable uses than re-refining. The increased competition for the available used oil reduced the flow of feedstock to the re-refiners and produced higher prices for the used oil that they were able to obtain. These increased prices occurred during the same period in which overcapacity in the fresh oil market brought lube oil prices down sharply. Lower lube oil prices prevented the re-refiners from passing the increased costs for the used oil along to the consumers.

These financial losses drove many of the re-refiners out of business. Those who survived were still in a depressed market and lacked the capital necessary to upgrade their facilities. Upgrading of the re-refining facilities was essential to keeping pace and competing with the fresh oil lube industry which was rapidly developing higher levels of refining technology to meet improvements in automotive and lubricant technology. Because of their inability to upgrade their technology, those re-refiners who did survive were often producing a product whose quality was not

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[30] National Bureau of Standards Special Publication 674. "Proceeding, Conference on Measurements and Standards for Recycled Oil-IV," held at NBS, Gaithersburg, MD, September 14-16, 1982 (Issued July 1984), presentation of James A. McBain entitled "Recent Factors Affecting the Oil Recycling Industry," at page 5.

comparable with the fresh oil industry. This situation cast a stigma of product inferiority which, although almost completely unfounded today, still plagues the re-refined lube oil industry.[31]

Most industries who serve a significant need of society survive these types of market shifts; however, the oil recycling industry had the added burden of several poorly designed federal actions which, in conjunction with this period of extreme market stress, severely stunted the technological and economic growth of the industry.

The first of these federal actions was the tax treatment which has plagued the re-refining industry since the Revenue Act of 1932.[32] This Act placed a four cents per gallon tax on lubricating oil as part of a broad effort to increase federal revenue during the depression. The applicability of this tax to the lubricating oil products of the re-refining industry became the subject of controversy for the next 24 years. The issue was whether the re-refiners were to be treated as "manufacturers" under the Internal Revenue regulations. Since only "manufacturers" were subject to the excise tax, this issue was of great interest to both the re-refiners and their competitors.[33] During the first six years the Bureau of Internal Revenue (BIR) issued exemptions to some re-refining companies but not to others; however, from 1938 to 1954 favorable

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[31] Id.

[32] P. L. No. 72-154, section 601.

[33] Irwin and Liroff, "Used Oil Law in the United States and Europe," prepared for the Office of Research and Development, U.S. Environmental Protection Agency, Contract No. 68-01-2203, July 1974, at pages 28-30.

rulings were given all re-refiners who applied for tax exemptions.[34]

This was not the four cents per gallon advantage it might appear. This competitive advantage for the re-refiners was significantly reduced due to the BIR regulatory stipulation that no tax would be imposed upon any material used in the manufacture or production of a taxable article.[35] Unlike the competing "manufacturers" of lubrication oil from virgin products, who were able to pruchase virgin oil free of tax for use in blending for the production of a taxable end-product, the re-refiners with a "non-manufacturer" BIR excise tax exemption on their end-products had to pay tax on the virgin oil which they purchased to mix with their reprocessed oil in order to upgrade it.[36]

Even the small advantage that did exist for the re-refiners brought heavy attack by the fresh oil industry. Between 1939 and 1949 the fresh oil industry was able to get a series of seven legislative proposals to tax the re-refining industry introduced by four members of the House Ways and Means Committee and the Senate Finance Committee; however, none were reported from committee.[37] In 1954, The National Petroleum Association went so far as to file a suit seeking a mandatory injunction requiring the IRS to collect excise tax on reprocessed oils represented and sold as

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[34] See examples cited in "Memorandum: Excise Tax on Lubricating Oil," (Arlington, Virginia: Association of Petroleum Re-refiners, 1955) at 2.

[35] Revenue Act of 1932, P. L. No. 72-154, section 620

[36] Id.

[37] Irwin and Liroff, supra note 33, at 30.

equivalent to new lubricating oils.[38] The IRS notified the Association of Petroleum Re-refiners in March 1955, that it was going to attempt to tax reprocessed oil; however, shortly thereafter and subsequent to further study and meetings with the re-refining industry, the IRS abandoned this attempt and in T. D. 6197[39] changed its definition of the term "manufacturer" to give recognition to the de facto taxation of re-refiners that had existed since 1938.

This action resulted in a greater competitive advantage in the lubrication oil market for the re-refiners. For products made exclusively of reprocessed oil, the re-refiners were able to avoid the newly increased six cents a gallon tax paid by their virgin oil market competitors. For products made of both virgin and reprocessed oil, if a 50-50 mix was used, the re-refiners had a three cent a gallon competitive edge, since they only had to pay excise tax on the portion of their product that consisted of virgin oil.[40] The position of the re-refiners was that because their profit margin was so small they were only able to continue to operate because of the tax distinction between their product and virgin lubricating oil.[41] The re-refining industry maintained that they needed the advantage because they performed a public service by

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[38] Barkow Petroleum Company v. T. Coleman Andrews, Commissioner of Internal Revenue (D. D.C.), petition for dismissal filed October 21, 1954 following receipt of a letter from the Commissioner of the Internal Revenue dated October 15, 1954.

[39] T. D. 6197, Cum. Bull. 56-2, 803 (1956).

[40] Irwin and Liroff, supra note 33, at 32.

[41] Hearings on the Federal Excise Tax Structure Before the Committee on Ways and Means, U.S. House of Representatives, 88th Congress, 2nd Session, July-August, 1964 at 689-690 and 231.

providing an alternative to the mere dumping of used oil into the environment and that their alternative promoted resource conservation and elimination of used oil as an environmental pollutant.[42]

In 1964, Congress and the administration began efforts to eliminate many excise taxes, including the complete elimination of the excise tax on lubricating oil,[43] which had developed over the years and which were widely viewed as imposing excessive burdens on the markets. The Congress recognized the hazards to the re-refining industry of their actions as evidenced in the following:

> The House recognized that the outright repeal of this tax might present problems for the rerefiners of oil who presently are not subject to the lubricating oil tax and whose profit margin generally is smaller than the amount of this tax. The House recognized that to repeal this tax outright would drive many rerefiners out of business and it was noted that this would have the effect of encouraging the dumping of used oils in our streams rather than salvaging it through rerefining.[44]

The resulting Excise Tax Reduction Act of 1965[45] (ETRA) eliminated the re-refiners three cents per gallon competitive advantage in the non-highway lubricating oil market by providing for an exemption from the general excise tax on virgin lubricating oil used in other than highway vehicles. This tax was normally refunded to the ultimate user. IRS Revenue Ruling 68-108[46]

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[42] Id.

[43] Id. at 620-627.

[44] Id. at 534.

[45] P. L. 89-44.

(notwithstanding what may or may not have been the intent of Congress)[47] declared re-refiners' off-highway customers ineligible for the rebate of the tax on the virgin oil component of blended products. This rebate was available to the off-highway customers of virgin oil refiners. In addition, the previously allowed exemption for blends of re-refined and virgin oil was disallowed. Therefore ETRA and this IRS Revenue Ruling, beyond eliminating the previous three cents per gallon advantage, actually placed the re-refiners' 50-50 blend at a nine cents per gallon competitive disadvantage with respect to virgin oil marketers. For example, when re-refiners mixed 50 percent new lube oils with re-refined oil, they paid a six cents per gallon tax (thus a three cents per gallon tax on the resulting blend) on the new lube oils, since for the purposes of the non-highway use exemption they were not considered "users" and thus had to pay the tax. In addition, when the refiners sold the new lube oils mixed with re-refined oil to non-highway users, there was an additional six cents per gallon tax disadvantage because these customers were not eligible for the rebate. This situation remained in effect until it was corrected with the passage of the UORA in

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[46] Revenue Ruling 68-108, Cum. Bul. 68-1, at 561, declares the re-refiners and their off-highway customers ineligible for rebate of the tax on the virgin oil component of blended products, which is available under ETRA to the non-highway user for the tax paid on virgin lubricating oil. The IRS position was that even though a re-refiner had "used" the virgin oil in his blending process, he had not "used" it "otherwise than in a highway motor vehicle" within the meaning of section 6424 of the Internal Revenue Code and thus he was not entitled to a rebate.

[47] See, Irwin and Liroff, supra note 33, at 37 and 54-55.

1980.

While the tax battle was being lost by the re-refining industry it was also losing its second oldest fight with another federal agency. The Federal Trade Commission (FTC) had been aggressively policing the trade practices (labeling) of the oil reprocessing industry since 1940. Between 1940 and 1964, when the FTC finally promulgated a trade industry regulation applying to all oil reprocessors' marketing practices,[48] the FTC issued 17 orders and agreed to 26 stipulations restricting individual oil reprocessors.

The courts offered no relief from the FTC actions for the industry. In Mohawk Refining Corp et al v. FTC[49] Mohawk appealed an FTC order that among other things said that Mohawk's failure to disclose the source of its lubricating oil product was a violation of the Federal Trade Commission Act. The court held that: (1) the public prefers new oil to reprocessed used oil; (2) though the two might be equivalent in quality, the public is being mislead if it purchases used oil that it believes to be new; and (3) "the public is entitled to get what it chooses, though the choice may be dictated by caprice or by fashion or perhaps by ignorance."[50] Therefore labeling would be necessary to distinguish new oil from used oil.

The FTC went beyond merely requiring labeling and actively enforced against what it felt was inadequate labeling. In an action against the Royal Oil Corporation, which was following North Carolina law and labeling its reclaimed oil as "re-processed," the

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[48] See infra note 52.

[49] 263 F.2d 818 (3rd Cir. 1958).

[50] Id.

FTC contended that although it complied with state law, this label did not adequately disclose the used oil origins of the reclaimed product.[51]

In 1964 the FTC established a trade regulation rule[52] governing sales of reprocessed oil. During the process of developing this rule the FTC, in response to re-refiners' assertions that they performed a public service in disposing of used oil and that their products were as good as or better than many oils produced entirely from virgin crude stock,[53] commented:

> The value of the service rendered by this industry is not germane to this consideration, nor is the equality of reclaimed oil involved here. It is not necessary, therefore for the Commission to pass upon the relative merits of new and reclaimed oil.[54]

The FTC determined in its ruling that it constitutes an unfair method of competition and an unfair and deceptive act: (1) to represent used lubricating oil as new and unused; (2) to fail to disclose clearly and conspicuously that such used lubricating oil has been previously used; and (3) to use the term "rerefined" to describe previously used

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[51] In the Matter of Royal Oil Corp, et al, Docket No. 6702, 54 FTC 1291 (1958) at 1292. The Fourth Circuit unanimously upheld this FTC action in Royal Oil Corp. et al v. FTC, 262 F.2d (4th Cir. 1959); 1959 Trade Cases section 69 at 234-235.

[52] "Trade Regulation Rule Relating to Deceptive Advertising and Labeling of Previously Used Lubricating Oil," 16 C.F.R. 406 (adopted July 28, 1964; effective September 1, 1965).

[53] Irwin and Liroff, supra note 33, at 47.

[54] Id. at 4.

lubricating oil unless the physical and chemical contaminants acquired through previous use had been removed by a refining process.[55] These restrictive labeling rules remained in effect until they were eliminated by the Used Oil Recycling Act of 1980.[56]

While having to deal with the stigma caused by these labeling requirements the re-refining industry suffered yet another blow. The Defense Supply Agency (DSA) procurement specifications[57] eliminated re-refined oil from its procurement list in such a way that no matter how good a re-refined oil was it was not allowed to qualify under these specifications.[58] This action precluded the acquisition of reprocessed oil by the Department of Defense (DOD), and since DOD specifications were utilized by virtually all government agencies down through the state and local levels, the entire governmental market was closed to the re-refining industry.[59] It is ironic that this prohibition was not due to any problem with the quality of the re-refined products, but simply because DSA lacked data concerning the quality of re-refined oil

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[55] Id.

[56] P. L. 96-463, section 4, 94 Stat. 2056 states "no requirement of any rule or order of the Federal Trade Commission may apply, or remain applicable, to any container of recycled oil (as defined in section 383(b) of such Act [Energy Policy and Conservation Act]) if such requirement provides that the container must bear any label referring to the fact that it has been derived from previously used oil."

[57] Military specification (MIL Spec) Mil-L-46152 and MIL-L-2104C.

[58] See Irwin and Liroff, supra note 33, at pages 51-52, and National Bureau of Standards Special Publication 674, supra note 30, at page 5.

[59] National Bureau of Standards Special Publication 674, supra note 30, at page 5.

stocks.[60] In the late 1970's and 1980's the DOD altered its specifications to allow several re-refined oil products to qualify under military specifications.[61]

The process of overcoming these disadvantages weakened the industry; however, it made the Congress aware of: (1)the problems of the recycled oil industry; (2) the value of used oil in a time of increasingly scarce energy and materials resources; and (3) the potential threat to the public health and the environment of the improper reuse and disposal of used oil.[62] This point is important since at least in the minds of the re-refining industry the failure of EPA to effectively regulate the recycling of used oil is viewed as

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[60] Irwin and Liroff, supra note 33, at page 51.

[61] 52 FR 38838 (October, 19, 1987), "Guideline for Re-refined Oil Content in Oil Procured by the Federal Government," (Action: Proposed rule.), at 38841 states "To date, DOD has revised the specifications for administrative vehicle engine lubrication oils (MIL-L-46152), tactical/combat vehicle engine lubricating oils (MIL-L-2104), Arctic engine oils (MIL-L-46167), and gear lubricants (MIL-L-2105)." The notice also notes that the existing specifications for hydraulic fluids (MIL-H-5606 and MIL-H-6083) contain no exclusions of re-refined oils. The purpose of the proposed rule (52 FR 38838) was to begin implementation procedures for section 6002(e) of RCRA which requires the EPA to designate items which can be produced with recovered materials and to prepare guidelines to assist procuring agencies in complying with the requirements of section 6002. Once EPA has designated an item, section 6002 requires that any procuring agency using appropriated Federal funds to procure that item must purchase such items containing the highest percentage of recovered materials practicable. See also National Bureau of Standards Special Publication 674, supra note 30, at page 5.

[62] See "Used Oil Recycling Act of 1980," section 1 (codified at 42 U.S.C. 6901(a)), P. L. 96-463, 94 Stat. 2055.

one of the most frustrating obstacles to getting the industry back on track.[63]

In order to understand the need for and dangers of federal regulation of used oil, it is first necessary to examine the generation of used oil and the characteristics of the industry which attempts to recycle as much of it as possible.

(d) The Sources of Used Oil in the United States

The total volume of used oil generated in the United States each year is a factor of the quantity of new oil sold into each major use category. Generally new oil sales are grouped into the major use categories of automotive and industrial.[64] Based upon 1983 automotive and industrial new oil sales, the most current data available,[65] of 1,251.0 and 1,061.0 million gallons, respectively, it is estimated that approximately 699 million gallons of used automotive oils and 507 million gallons of used industrial oils are generated each year.[66] These generation rates result in the

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[63] National Bureau of Standards Special Publication 674, "Recent Factors Affecting the Oil Recycling Industry," supra note 30, at 6, statement of James A. McBain, Executive Director of the Association of Petroleum Re-Refiners.

[64] Franklin Associates, supra note 25, at section 1, page 4, (figure 1).

[65] Hazardous Waste News, "DOE Report Assesses Environmental Impact on Waste Oil Industry," Volume 37, No. 7, July 1987, at page 780.

[66] Franklin Associates, supra note 25, at section 1, page 4, (figure 1).

production of 1.206 billion gallons of used oil each year which, if not utilized as a resource or properly disposed of, become a major hazard to the public health and the environment.

Generation rates for used oils also depend upon losses which occur during use or handling. These losses are usually the result of leakage, spillage, combustion, disposal with equipment (e.g., disposal of electrical, cooling, and hydraulic oils with decommissioned equipment containing these oils), and incorporation into a finished product such as paint, putties, rubber, etc.[67] The waste generation rate for new oil sold into the automotive market is about 55.9 percent compared to about 47.8 percent for the industrial oils. The lower rate of generation for industrial oils is primarily due to the relatively small used oil generation rates for some large industrial operations such as *metal protecting*, *industrial engine* oils and process oils which collectively represent about 42.8 percent of end-use customers of industrial oils.[68]

The largest single source of used oil generation is individuals operating on-road personal vehicles who change their own engine oil. These do-it-yourself oil changers (DIYer) account for almost 19.8 percent of the total used oil generated, which is the significant sum of 239.2 million gallons of used oil generated per year from sales of 356.9 million gallons per year to these individuals.[69] The DIYer figures are all the more significant because of all the sources of used oil generation this source can be the most difficult to effect

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[67] Id. at section 1, page 5.

[68] Mueller Associates, supra note 22, at page 5.

[69] Id. at page 5 and 6 (table 1).

through regulation. The second largest source is industrial hydraulic oils with 16.6 percent (200 million gallons of used oil generated from sales of 264 million gallons of new oil) followed by commercial vehicles with about 15.5 percent (187.1 million gallons of used oil generated from sales of 298.6 million gallons of new oil) of the total used oil generated in 1983. These three sources alone account for approximately 51.9 percent of the used oil generated in the United States.[70]

The potential number by type of used oil generators is also significant since this vast universe of varied sources must be factored into any attempt at a regulatory effort. Beyond the potentially tens of millions of DIYers there are approximately 232,590 establishments or sites which generate automotive used oil.[71] Automotive generators include: service stations; repair shops; automotive service centers associated with chain stores; automobile dealerships; state or local government collection centers; and truck stops, garages, and fleet repair shops that service gasoline and diesel-fuel vehicles.[72] There are approximately 218,328 industrial used oil generators consisting of a vast array of industrial activities ranging from automobile manufacturers to chemical producers.[73] With the exception of the

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[70] Id.

[71] Franklin Associates, supra note 25, at section 3, page 18 and table 14.

[72] Temple, Barker and Sloane, Inc., "Regulatory Impact Analysis of Proposed Standards for the Management of Used Oil," prepared for the Economic Analysis Branch, Office of Solid Waste, U.S. EPA, November 1985 at section III, page 2.

[73] Franklin Associates, supra note 25, at section 3, page 18, (table 14).

DIYers, used automotive oils are usually generated at central locations (maintenance facilities) while industrial used oils are generally produced at more geographically dispersed sources (industrial machinery physically separated from a central facility).[74]

The majority of the used oil (514 million gallons per year or 54.5 percent of the total) is generated by sources who produce greater than 1,000 kilograms per month (about 300 gallons per month) of used oil; however, these large generators represent only 7.4 percent (48,000 out of 653,000 establishments)[75] of the total number of establishments generating used oil. Those generators who produce between 100-1,000 kilograms of used oil per month total approximately 226,000 and produce about 384 million gallons per year. Thus the majority of the generators (379,000 of 653,000 establishments) are small businesses who generate less than 100 kilograms of used oil per month, with a combined generation rate of 46.7 million gallons per year.[76]

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[74]Mueller Associates, supra note 22, at page 8.

[75]The data on the total number of establishments generating used oil presented by EPA in its November 29, 1985, proposed rule for "Recycled Used Oil Standards", 50 FR 49,212, does not match the data for this item presented in the Franklin Associates study cited in notes 71 and 73 supra. As noted in Mueller Associates, supra note 22, at 8 there is no available explanation as to the differences in these two reports. This data variation serves as an example of data and information problems for the used oil industry and those who are charged with regulating it discussed in Chapter II(b) of this paper.

[76]50 FR 49,212 (November 29, 1985), "Hazardous Waste Management System; Recycled Used Oil Standards," (Action: Proposed rule.), at page 49,224, Table 3. The referenced table notes that these estimates presented do not include 167 million gallons of used oil disposed of each year by DIYers oil changers, or the 44 million gallons of "non-industrial" (automotive) oil generated each year on

(e) Overview of "The Used Oil Management System"

The quantity and generation source of used oil is equalled in importance by the flow of this used oil within the used oil management system (U.O.M.S.). This U.O.M.S. encompasses the flow of used oil from generation to end-use and includes those companies that collect, process and sell used oil into the end-use markets.[77] Three basic types of companies are involved in this system: (1) independent collectors, who only collect and sell used oil; (2) processors, who collect, process and sell an improved product oil; and (3) re-refiners, who collect, process and sell a re-refined lube base stock.[78]

In 1983 only 669.1 million gallons or 55.5 percent of the 1.2 billion gallons of used oil generated in the United States were gathered into the U.O.M.S. by collectors and reclaimers. This amounts to only 28.9 percent of the new oil sold that year (669.1 million out of 2.3 billion gallons) being accumulated by generators and recovered by the used oil management system.[79] The remainder is reused as a lubricant or fuel, dumped, or disposed of by the generators, primarily the DIYers.[80] As an example, in 1983 DIYers

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an estimated 2.4 million farms.

[77] Temple, Barker and Sloane, supra note 72, at section III, page 1.

[78] Franklin Associates, supra note 25, at section 1, page 5.

[79] Mueller Associates, supra note 22, at 8; see also Franklin Associates, supra note 25, at section 3, page 17 and section 3, page 8, (figure 2) for a detailed description of the used oil flow in the United Stated in 1983.

consumed and/or discarded approximately 166.8 million gallons of generated oil (disposal 40.8 million gallons, dumping 118.0 million gallons and burning 8.0 million gallons), while other automotive and industrial generators eliminated an additional 370.2 million gallons by use as fuel, road oiling, disposal, incineration and by the dumping of approximately 123 million gallons of used oil.[81]

Those generated used oils which are not accumulated for collection are obviously not available for reuse. It is much more common for agricultural and construction machinery operators, DIYers and small generators of industrial oils to dump or dispose of their used oils rather than accumulate them or take them to a point of accumulation.[82] This is the primary reason for the relatively low collection rate (317.4 out of 699.0 million gallons or 45.4 percent) of automotive oils compared to industrial oil's 69.4 percent collection rate (351.7 out of 507.1 million gallons).[83] Each of these end-uses, from uncontrolled disposal to recycling, has its own particular set of public health and environmental problems. These issues will be presented in a later chapter.

The U.O.M.S. starts with the generators, who as discussed earlier are classified as either automotive or industrial. It is these individuals who make the initial decision as to what fate the waste

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[80] Franklin Associates, supra note 25, at section 1, page 6 and 8, (figure 2).

[81] Id. at page 8, (figure 2) and section 3, page 17.

[82] Id. at section 3, pages 17 and 19.

[83] Id. at section 1, page 8, (figure 2), and Mueller Associates, supra note 25, at page 8.

oil will have: (1) collection for entry into the U.O.M.S.; (2) controlled or uncontrolled disposal; or (3) an end-use by the generator.

Sources of automotive used oil are classified as generators or non-generators. If the used oil is accumulated at the source, the source is classified as a generator. A few of these generators reuse the accumulated used oil on-site; however, the majority sell their oil to a collector who is a part of the U.O.M.S.[84] The non-generator sources do not accumulate the used oil at the source, and consist primarily of DIYers and equipment operators in the farming, construction, mining and forestry industries. Little oil generated by these non-generator sources is ever recovered, with most being dumped on the ground or mixed with other solid waste for disposal.[85] While there are approximately a quarter-million generators of used automotive oil, there are potentially millions of non-generators.[86]

Of the approximately 532 million gallons of used oil accumulated by automotive generators about 215 million gallons is used on-site, while about 318 million gallons is collected by the U.O.M.S.[87] The on-site uses include: (1) burning directly in space heaters; (2) burning a used oil mixture as a diesel fuel in vehicle engines; (3) road oiling for dust control; and (4) mixing with fuel oil for burning in on-site boilers.[88] The number of waste oil heaters

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[84] Franklin Associates, supra note 25, at section 3, page 19.

[85] Id.

[86] Id. at page 18 (table 14).

[87] Mueller Associates, supra note 22, at page 11, (figure 3); see also Franklin Associates, supra note 25, at section 3, pages 19-21.

sold from 1979 to 1983 was reported by a 1983 EPA study to be 33,900.[89] This number is a significant indicator of one use of waste oil which does not enter the U.O.M.S., and it is likely that a number of these heaters are owned by individuals such as farmers, mining companies, and even individuals, who without such devices would probably simply dump this oil.

Several types of companies are involved in the accumulation of used automotive oils for collection by the U.O.M.S., to include: service stations; repair and maintenance shops; vehicle dealers; fleet shops; and recycling centers.[90] The major portion of the used oil accumulated by automotive generators and processed into the U.O.M.S. is generated on site; however, a small amount is brought to generators by DIYers. Unfortunately, this accounts for only 14 percent of DIYer generation and amounts to only about five percent of the total used automotive oil which is accumulated at these locations.[91] One problem associated with these generation sites is that small amounts of cleaning and degreasing solvents are routinely put into the oil by mechanics working at these sites.[92]

The average automotive oil generator accumulates 500 gallons

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[88]Franklin Associates, supra note 25, at section 3, page 19.

[89]Development Planning and Research Associates, Inc. "Selected Characteristics of the Waste Oil Space Heater Industry," Prepared for U.S. EPA, July 1983.

[90]Franklin Associates, supra note 25, at section 3, page 18, (table 14) and section 3, page 20.

[91]Id. at section 3, page 21; see also Brinkman, D.W., M. Gottlieb, and K. Koelbel, "Used Motor Oil Poses Environmental Problem," Oil & Gas Journal, August 9, 1982.

[92]Franklin Associates, supra note 25, at section 3, page 21.

of oil per month, with this amount ranging between 100 to 2,500 gallons. Until recently most automotive oil generators were paid for their oil by collectors. The prices paid varied widely and depended primarily on oil demand and collector competition in a given region. In 1983, the typical price for a gallon of quality used oil was 20 cents, with variations ranging from zero to 45 cents.[93] Today it is not uncommon for a generator to have to actually pay a collector to pick up used oil;[94] however, this disparity (of payment verses charging) has occurred for many years.[95]

The majority of used industrial oils, 68.5 percent (351.7 out of 513.8 million gallons), is collected as part of the U.O.M.S. Of those industrial used oils not entering the U.O.M.S., 8.6 percent is reclaimed for internal reuse, 7.2 percent is used as a fuel supplement, 2.4 percent is incinerated, 0.7 percent is used to suppress dust through road oiling and the remaining 12.6 percent is discarded.[96]

Due to the great diversity of industrial establishments, there are literally hundreds of combinations of oil types which may be available to a collector. Segregation of the oil by given oil types is

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[93] Id.

[94] Id. at section 3, page 26.

[95] See Teknekron, Inc., "A Technical and Economic Study of Waste Oil Recovery," EPA Contract No. 68-01-1806, October 1973, part III at page 21. The 1973 Teknekron study summed up the general trend in collection practices by noting that in the middle 1960's collectors were paying for used oil, by 1970 they were charging for collection service, but by 1973 the price situation had returned to that of the middle 1960's.

[96] Mueller Associates, supra note 22, at pages 11 and 12, (figure 4).

common for large quantity industrial generators who generate on-site; however, contamination of industrial used oils is also common due to usage of the oil storage containers as "catch-alls" for any liquid waste generated on-site.[97]

Industrial facilities may generate anywhere from under one hundred to over one hundred thousand gallons of used oil per year. If oil emulsions are included, some facilities generate over a million gallons per year; however, the typical generation rate for straight mineral oils seldom exceeds a few thousand gallons per year.[98]

Since only a small fraction of industrial facilities have oil inventory programs to account for oil purchases, recovery and sales, actual losses are difficult to verify. One Department of Energy report[99] indicates that most industrial facilities cannot account for up to 50 percent of their oil purchases. Losses are the result of a variety of causes including: sloppy accountability methods and actual losses down drains; miscellaneous spills; oil on cloth and

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[97] Franklin Associates, supra note 25, at section 3, page 24.

[98] Id. at page 25, and at section 2, page 3 provides the following definition, "Emulsified oils are an oil-water mixture with an addition of small amounts of emulsifying chemicals and biocides. Most emulsions contain from two to 10 percent oil; however, higher oil fractions are sometimes used in some applications (e.g., hydraulic oils). Most emulsified oils are used as lubricants and coolants in metalworking applications, but a significant volume is also used in the hydraulic fluid market, particularly where fire resistance is desirable."

[99] Gabris, Tibor, "Emulsified Industrial Oils Recycling," by Springborn Laboratories, Inc., Contract number DOE/BC10183-1. Bartlesville Energy Technology Center, U.S. Department of Energy, April 1982.

paper wipe; and oil included in the final products.[100]

Waste oil accumulated on the plant site by industrial used oil generators may be: (1) treated on-site for reuse; (2) transferred to an independent collector for processing and/or disposal; or (3) treated on-site to improve the quality and then transferred to an independent collector. Each of these three management methods is in common practice.[101]

The next step after generation in the U.O.M.S. is performed by the intermediary facilities. Intermediary facilities can be of three major types: (1) independent collectors; (2) major and minor processors; and (3) re-refiners.[102] Generally these companies interact with one another and the generators to form the U.O.M.S. which provides the mechanism for used oil to flow from its point of generation to its ultimate reuse or disposal.[103]

Approximately 80 percent of all firms (700 of 953) owning a collection facility are collectors only, that is they are engaged in used oil collection but not in used oil processing.[104] These independent collectors may or may not store used oil. Even though they do not actively process used oil, some separation of water and

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[100]Franklin Associates, supra note 25, at section 3, page 25.

[101]Id.

[102]Temple, Barker and Sloane, supra note 72, at section III page 3; see also, Franklin Associates, supra note 25, at section 1, page 8, (figure 2) and section 4, page 3, (table 30) for an additional and extremely detailed break down of these general categories into nine selected representative facility types involved in the collection and processing of used oils.

[103]Franklin Associates, supra note 25, at section 2, page 4.

[104]Temple, Barker and Sloane, supra note 72, at section III page 3.

solids may occur during storage; however, separation of layers is unusual, because storage tanks at collector facilities are usually pumped dry.[105] The primary function of the independent collector is the selling of the collected materials to re-refiners, processors, or directly to end-use markets such as burning, fuel oil dealers, and road oiling.[106] In 1983 these firms, who typically operate two collection vehicles and use two to five storage tanks (usually above-ground), collected about 167 million gallons of waste oil and sold it into the U.O.M.S..[107]

These independent collectors sell about 35 percent of their oil directly to end-users (15 percent to road oilers and 20 percent for use as fuel). Because the prices received from these user markets are 30 to 80 percent higher than those received from the intermediate product markets of processors and re-refiners, the independent collectors prefer to sell their oils directly to these end-users. The remaining 65 percent of the collected oils, for which one of the above mentioned preferred buyers cannot be found, is sold to processors (45 percent) and to re-refiners (20 percent).[108]

In total, these independent collectors gather only about 25 percent of the oil passing from the generators into the management system. The majority of the used oil entering the U.O.M.S. (75

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[105] Id. at section III page 4; see also, Franklin Associates, Ltd., Model Selection and Characterization of Various Industry Sectors (July 1983).

[106] Franklin Associates, supra note 25, at section 2, page 4.

[107] Id. at section 4, page 5, (figure 5) and page 6.

[108] Id.

percent which is over 500 million gallons per year) is collected directly by the companies involved in processing or re-refining the oil.[109] Thus the used oil gathered by the independent collectors, combined with that obtained by the processors and re-refiners, adds up to about 90 percent of all oils which enter the U.O.M.S. ultimately being processed to some degree. Of the oils which are processed, about two-thirds is handled by a major processing facility; 20 percent by a minor processing facility; and only 14 percent by a re-refiner.[110]

The final step in the U.O.M.S. is performed by the used oil processors, which are of two major categories:[111] reprocessors (this category, which is also referred to as processors, can be broken down into minor and major processors depending upon the level of processing technology involved);[112] and re-refiners.

There are 100-150 companies employing "minor processing technology" exclusively, with their facility size varying from 250,000 to 5,000,000 gallons annual throughput. Minor processing technology consists primarily of in-line filtering and gravity settling with or without heat addition. The heating is only to decrease viscosity and improve gravity settling, and these facilities

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[109] Id. at section 4, page 5, (figure 5).

[110] Id. at section 4, page 4.

[111] Temple, Barker and Sloane, supra note 72, at section III, page 4.

[112] The most recent comprehensive study, which was made by Franklin Associates, supra note 25, devotes considerable study to this distinction in section 4, pages 6-14 and in section 2, pages 4-5. Most earlier studies simply note variations in technology utilized by processors without defining a separate category. See for example Temple, Barker and Sloane, supra note 72, at section III, pages 3-4.

often use some of the collected used oil as fuel for this heat .

Many minor processors collect and handle other waste materials such as solvents. The mixing of these solvents (usually high energy-nonchlorinated solvents) with the used oil is not uncommon. These minor processors sell their product into five general markets: (1) direct fuel sales; (2) virgin fuel oil dealers (V.F.O.D.); (3) non-fuel industrial users (e.g., phosphate industry flotation oil); (4) road oiling; and (5) major waste oil processors.[113]

The objective of the minor processor is to improve the quality of the used oil it has collected to some degree in order to make it a more acceptable product for these various markets. The steps necessary to provide this improvement in quality usually involve the separation of unwanted materials from the oil, thus creating waste products. These waste products are in the form of four residues: filter residue; wastewater, sludge and tank bottoms.[114] Each of these waste by-products has public health and environmental impacts which will be addressed in a later chapter.

Major processors employ the methods utilized by the minor processors plus more sophisticated processing technology consisting of tertiary treatment devices to further increase oil

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[113] Franklin Associates, supra note 25, at section 4, page 5, (figure 5) and pages 6-7.

[114] Id. pages 8-9. Sludge differs from tank bottoms in that sludge is generated rapidly as part of the normal layering associated with settling. Tank bottoms are the thick tar-like layer which forms slowly over a period of months or years. Some processors may not separate out the sludge layer, but instead simply pass it along with their product oil. In addition, some processors may never clean their tanks and thus never generate tank bottoms.

quality or to blend/mix materials into the oil. These additional items of equipment include distillation towers, large filter screens, centrifuges, agitators and blending devices.[115] There are between 100 and 150 major processor companies. These companies, which vary in size from processing about one million to ten million gallons of oil per year, are generally larger than minor processors. Major processors which are involved in blending used oil with virgin fuel oils tend to be larger than those which do not blend.

Most moderate and large sized major processors operate large transport vehicles (6,000 to 9,000 gallons) in addition to the smaller route trucks (1,500 to 4,000 gallons) operated by major processors of all sizes. Major processors also maintain a wide variety of oil storage facilities, with most facilities having several tanks of moderate size for a typical total storage capacity of about 200,000 gallons. Impoundments, drums and collection basins are also commonly used as alternatives for oil and residue storage and disposal. It is also significant that many major processing companies are also licensed to transport and process hazardous wastes, particularly solvents, and sometimes mix these solvents (usually non-chlorinated) with oil as a means of disposal and to decrease used oil viscosity.[116]

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[115] Id. pages 10-11. Distillation towers are used to evaporate light fuel fractions and water from the waste oil. The hydrocarbons are collected while the evaporated water vapor is released into the atmosphere. None of the lube fraction is distilled. Filter screens and centrifuges separate fine solids from the oil. Agitators are used to mix emulsion-breaking chemicals in waste oil. Blending devices are used to mix virgin fuel oil or other material into product oil.

The markets for the major processors' products is the same as for the products of the minor processors; however, because of the higher quality of their products major processors generally receive two to three cents more per gallon from most end-users than do minor processors. In 1983 the highest price received by processors for the processed used oil was from sales to asphalt plants or large industrial boilers who paid from 50 to 65 cents per gallon. Fuel oil dealers paid 40 to 60 cents per gallon and the non-fuel users, such as road oilers, paid 40 to 55 cents per gallon.[117]

The residues generated by the major processors are generally the same as for minor processors; however, because of the more sophisticated processes utilized by the major processors the variety of substances, concentrations and volumes are greater.[118] Overall the products produced by both major and minor processors are far below the quality of virgin oil, and commonly contain concentrations of lead, ash and chlorine,[119] and can contain a variety of other contaminates of significant concern.

In contrast to the often highly contaminated products of the used oil processors are the products of the re-refiners which produce primarily cleaned used oil to be sold as lube oil.[120] Compared to the relatively simple technologies of even the most sophisticated processor, the re-refiners' operations are extremely complex.[121] The

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[116] Id at pages 11-12.

[117] Id. at pages 12-13.

[118] Id. at page 14, (figure 7).

[119] Temple, Barker, and Sloane, supra note 72, at section III, page 4.

[120] Id.

major distinct types of re-refining technologies include: (1) solvent treatment/distillation/hydrotreating; (2) acid/clay; (3) vacuum distillation/clay polishing; and (4) chemical treatment/ demetallization/clay polishing. The distinctions between these technologies is very important because of the waste materials generated, coproduct and byproduct marketability, and the applicability of environmental regulation and control options.[122] Several of these aspects, particularly those concerning waste materials and environmental regulation, will be addressed with greater detail in later sections.

Re-refiners, due to economies of scale, tend to be larger than used oil processors. Modern re-refiners, which use primarily vacuum distillation technologies, process up to 20 million gallons of used oil per year, with an average facility processing between eight and ten million gallons per year. Smaller firms, those processing only two to four million gallons per year, rely mostly on acid/clay treatment. The use of the acid/clay treatment is becoming less

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[121]Details of this technology are beyond the scope of this general overview analysis of the U.O.M.S. For details of this complex technology see: (1) U.S. Department of Energy. "Energy Conservation: Review of All Lubricants Used in the U.S. and Their Re-refining Potential." #DOE/BC/30227-1 by Richard J. Bigda and Associates; (2) U.S. Department of Energy. "Energy Conservation: Enhanced Utilization of Used Lubricating Oil Recycling Process By-Products." Final Report #DOE/BC10059-19 by Rooz-Allen and Hamilton, Inc., March 1982; and (3) U.S. Department of Energy. "The Fate of Hazardous and Non-Hazardous Wastes in Used Oil Recycling," prepared for the Bartlesville Energy Technology Center by GCA Corporation, April 15, 1983.

[122]Franklin Associates, supra note 25, at section 4, pages 15-16.

common, and in 1983 there were only two or three of these small facilities in operation.[123] This small number is also due to the fact that recent EPA regulation closed several acid/clay process facilities.[124]

All re-refiners operate collection fleets which typically secure two-thirds of the oil to be treated, with the remaining one-third being obtained from independent collectors. Unlike processors, re-refiners typically also operate large, long distant, transport vehicles which bring feedstock to their facilities from distant points of collection and deliver finished products to customers. Re-refiners also differ from processors in that re-refiners use many small to medium-sized storage tanks rather than fewer large tanks. This is because processors are more likely to mix oil and therefore need fewer segregation tanks, while re-refiners prefer to segregate feedstocks and finished products according to quality and end-use.[125]

The basic process of producing re-refined, clean, high quality base lubricating oil begins with a pretreatment step, such as the application of heat and filtration, followed by one of the following

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[123] Id. at page 16, and Temple, Barker and Sloane, supra note 72, at section III, page 4.

[124] Mueller Associates, supra note 22, at page 48, (table 26), and page 17, "In the past, acid-clay was the most widely used process to re-refine used oil; however, the high cost of mitigating the environmental concerns associated with this process has forced the used oil re-refining industry to adopt alternative, relatively clean technologies such as vacuum distillation and solvent treatment."

[125] Franklin Associates, supra note 25, at section 4, page 17, and Temple, Barker and Sloane, supra note 72, at section III, page 5.

processes: vacuum distillation with clay or hydrogen finishing; solvent extraction with clay or hydrogen finishing; or chemical treatment with hydrotreating.[126] Generally these re-refining processes have the following characteristics:

(1) Most of the re-refining processes have an average product yield ranging between 70-80 percent;
(2) The majority of the re-refining processes will not accept PCBs-containing used oils.
(3) Re-refined oils preform as good as virgin oils.[127]

The basic technology for re-refining has been in existence since the early 1900's in Europe, where the primary motivation for recovery and reclamation was the low supply of local crude oil and the high cost of imported crude oil. Re-refining started in the United States during World War I when it was successfully used in military aircraft. World War II brought renewed interest and the industry prospered and grew rapidly during the 1940' and 1950's.[128]

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[126] Mueller Associates, supra note 22, at 47 and figures 5-8; see also Berk, David S., "Recycling Systems Give Waste Oil New Life," Plant Engineering, Vol. 35, No. 16, pp. 103-106, August 1981, and Chemical Engineering, Vol. 86, pp. 104-106, April 23, 1979.

[127] Mueller Associates, supra note, 22 at pages 47 and 48 (table 26) provides a detailed break down of the characteristics of the nine major re-refining processes and shows that there are exceptions to each of these generalizations. For example the "Phillips Re-refined Oil Process" (PROP) has a process yield of greater than 90 percent, few air emissions, excellent product quality and is available for commercial use, but it has high royalty payments which hinder its wide use. There is also a pilot plants process, the Krupp Research Institute Super-critical Process, which does accept PCBs-containing waste oils.

As discussed earlier, the industry continued to grow and by 1960 contained approximately 150 re-refiners producing about 300 million gallons of re-refined oil, which was about 18 percent of the lubricating needs of the United States.[129] By 1986 there were fewer than 16 re-refiners producing less than 63 million gallons of re-refined oil per year.[130] This number, which was not the lowest point in the industry's history, was reached after a minor rebirth of the industry in the early 1980's when eight new re-refining facilities were built and the membership in the Association of Petroleum Re-Refiners almost doubled.[131] Currently there is some difference of opinion among researchers as to whether the re-refining industry is headed toward growth or is in decline;[132] however, two major factors which will certainly push toward its

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[128] Id. at page 45; see also, National Bureau of Standards Special Publication 674, "Recent Factors Affecting the Oil Recycling Industry," supra note 30, presentation of James A. McBain, at page 5.

[129] National Bureau of Standards Special Publication 674, "Recent Factors Affecting the Oil Recycling Industry," supra note 30, presentation of James A. McBain, at page 5; see also, Brinkman, Dennis, W., "Waste Hydrocarbon Recycling," Chemical Engineering Progress, Vol. 82, No. 3, Pages 67-70, March 1986.

[130] Mueller Associates, supra note 25, at page 45.

[131] National Bureau of Standards Special Publication 674, "Recent Factors Affecting the Oil Recycling Industry," supra note 30, presentation of James A. McBain, at page 6.

[132] The Franklin Associates, supra note 25, at section 4, page 16, with its extensive telephone survey found some indications that the 1983 re-refining industry was likely to grow over the next decade, while the Temple, Barker and Sloane, supra note 72, "Regulatory Impact Analysis of the Proposed Standards for the Management of Used Oil" with its elaborate methodology presented in its section IV found the re-refining industry in the United States to be declining.

decline are low crude oil prices and the failure of the EPA to adequately regulate the utilization and disposal of used oil.[133]

The past decline of the re-refining industry has been attributed to a variety of reasons with the primary ones being:

(1) Undercapitalized small businesses;
(2) Lower crude oil prices;
(3) Higher feedstock prices as a result of competition from other uses of used oil;
(4) Specifications forbidding use of recycling materials;
(5) Elimination of government financial incentives;
(6) Restrictive labeling requirements; and
(7) High cost of environmental compliance.[134]

Currently there are only six re-refiners with a capacity greater than 10 million gallons per year. These larger re-refiners are located in California, Illinois, Indiana, New York, Pennsylvania and Texas. Several of these larger re-refiners exist primarily to provide large industrial customers with custom re-refined oil at the generator's own plants.[135]

The markets for lube oil are subject to stringent quality standards, therefore the only way for used oil to be recycled into this market is through a re-refiner.[136] The various technologies discussed earlier produce differing quantities and qualities of lube oil. As an example, the vacuum distillation process yields about ten

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[133] National Bureau of Standards Special Publication 674, "Recent Factors Affecting the Oil Recycling Industry," supra note 30, presentation of James A. McBain, at page 6.

[134] Mueller Associates ,supra note 25, at page 45.

[135] Temple, Barker and Sloane, supra note 72, at section III, page 5.

[136] Id. at section III, page 10.

percent more lube than acid/clay (about 75 percent compared to a 65 percent of input), and the basestocks produced in the vacuum distillation processes are more valuable than those produced by the acid/clay processes because of the quality differences. In addition, the acid/clay technologies are less capable than distillation processes of completely cleansing used oil of some metals, such as barium and zinc, which are often present due to the use of these additives.[137]

Since all re-refining facilities produce as their principal product a clean oil which is used primarily as a lubricating oil base, the markets for this industry are much better defined and understood than those for the reprocessors' product oil. In addition to the 62.7 million gallons of re-refined lube oil produces each year, the industry produces 6.0 million gallons of distillate fuel (most of which is burned on-site to provide heat), and 9.0 million gallons of distillation bottoms for use as asphalt extender and demetallizing filter cake for use in highway construction. The remaining 7.3 million gallons of the oil delivered to the re-refiners each year is disposed of primarily in the process residues including spent clay, acid sludge, and wastewater.[138]

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[137]Franklin Associates, supra note 25, at section 4, pages 17-18; see also, Department of Energy, "The Fate of Hazardous and Non-Hazardous Wastes in Used oil Recycling," prepared for the Bartlesville Energy Technology Center by GCA Corporation, April 15, 1983.

[138]Franklin Associates, supra note 25, at section 4, pages 17-18, (table 33).

III. THE COMPOSITION OF USED OIL AND THE ASSOCIATED HAZARDS

(a) The Hazards Associated with Crude and Refined Oil

In order to fully address the composition and hazards of used oil, it is first necessary to address the hazards associated with the chemical composition and physical characteristics of crude oil and refined products. Crude oil is not a chemically well-defined substance, rather it is a complex mixture containing literally thousands of compounds, including hydrocarbons, sulfur- oxygen- and nitrogen-containing compound, and metallo-organic compounds. Oils from various parts of the world differ widely in their composition; however, they are generally divided on the basis of their predominant hydrocarbon structure into three main groups: parafinic, naphthenic, and aromatic. Paraffinic (alkanic) crude oils contain mostly saturated straight and branch-chained carbon compounds, along with lesser amounts of cycloalkanes and aromatics. Naphthenic crudes contain relatively large quantities of compounds with at least one saturated ring structure (cycloakanes). Aromatic crude oils contain a large concentration of unsaturated benzene ring structures. The varying proportion of these three classes of compounds determine the physical as well as the chemical properties of crude oils.[139]

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[139] U.S. EPA Report to Congress, "Listing Waste Oil As A Hazardous Waste," supra note 10, at page 5-6.; see also, U.S. EPA, "Washington State Refineries, Petroleum, Petroleum Derivatives, and Wastewater Effluent Characteristics" (EPA 600/7-78-040), March 1978, page 38.

Refined oil products, such as lubricating oils, also have variations in chemical compositions depending upon the crude oil source and the process used to refine the oil. Refinery operations are a complex combination of inter-dependent processes including fractionational cracking, polymerization, and hydrotreating. The particular combination of processes used at a refinery determines the composition of the final product. The refining processes are chosen based on the type (e.g., fuel oil, lubricating oil) and characteristics (e g., high octane, low freezing point) of the products that are desired. Despite the fact that the composition of refined products is highly variable, the compounds in refined products are generally similar to those found in crude oils with the addition of (1) the olefin class of hydrocarbons, and (2) chemical additives designed to make the product perform more efficiently.[140]

Although the relative quantities of these compounds differ in crude oils, the average gross compositional data on all world crude yields the following approximate composition for the "average" crude oil: Paraffin hydrocarbons 30 percent; naphthene hydrocarbons 50 percent; aromatic hydrocarbons 15 percent; and nitrogen, sulfur and oxygen-containing compounds 5 percent [due to the approximations the total is not 100].

[140] U.S. EPA, Report to Congress, "Listing Waste Oil As A Hazardous Waste," supra note 10, at page 6-7. At page 7 the report provides the following explanations of olefin class hydrocarbons and chemical additives: "Olefins are straight or branched-chained aliphatec hydrocarbons with at least one double bond. They are used as feedstocks in certain refinery processes (e.g., alkylation and polymerization) to yield high octane blending components for motor gasoline and some jet fuels. . .The additive package differs depending on how the oil is to be used. For example, chemicals added to automotive engine oil to decrease engine knock differ from those added to an oil to lower its freezing point."

Before further addressing the constituent properties of oil, it must be noted that oil's general physical properties are such that an oil quantity sufficient to produce a sheen on the surface of water can cause harm to the aquatic environment by physically coating aquatic organisms and by causing adverse chemical changes within the organism.[141] The mere presence of oil floating on a body of water, even without the contamination which comes with use, can cause:

> ...inability of ducks to swim or dive for food in the presence of oil films; loss of insulating ability of feathers contaminated with oil and subsequent loss of normal body temperature and death; reduced viability of duck eggs due to oil-soaked plumage; pneumonia and gastro-intestinal irritations in waterfowl following preening of oil-coated feathers; inhibition of marsh grasses to reproduce; blocked chemoreception in fish larvae; increased susceptibility of seagrasses to parasites; abnormal development of herring larvae; and the killing of various organisms including copepods, shrimp, and white mullet.[142]

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[141] Id. at pages 16, 17, and 36. An oil layer at least 150 nanometers thick (1 nanometer equals 1 billionth of a meter), or 39.37 billionths of an inch, will produce a sheen. Oil spilled to surface water is subject to regulations (40 CFR Part 110) pursuant to section 311 of the CWA. EPA's Report to Congress, "Listing Waste oil As a Hazardous Waste" indicated that this coverage for oil spills on water is adequate and thus no further regulatory control under RCRA was warranted. In must be noted that concern should still exist as to the extent which the hazardous substances contained in the used or unused oil products are transferred to the water which may become a source of drinking water.

[142] Id.

It is also well documented that the sublethal effects of oil are significant, including disruption of feeding, breeding and locomotive behavior, and that the concentrations necessary to bring about these effects are often very small.[143]

In addition to these dangers, the aromatic, or water soluble, fraction of oil can contains several substances listed in Appendix VIII, "Hazardous Constituents", of 40 CFR Part 261 including: naphthalene, phenols, benzene, benz(a)anthracene and benzo(a)pyrene. The latter three have been identified by EPA's Carcinogen Assessment Group as exhibiting substantial evidence of carcinogenicity.[144] Substances listed in Appendix VIII have been shown to have toxic, carcinogenic, mutagenic or teratogenic effects on humans or other life forms; therefore, the presence of any of these constituents in a solid waste is presumed to be sufficient to list the waste as a hazardous waste, unless, after consideration of designated multiple factors, the EPA concludes the waste is not hazardous.[145]

Data on the presence of most carcinogens found in crude is limited; however, it has been estimated that the carcinogenic hydrocarbon content of crude oils generally falls within the 100 to 1,000 microgram per kilogram range.[146] Data on the carcinogenic

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[143] U.S. EPA, "Quality Criteria for Water," July 1976 at page 113.

[144] See 45 FR 79318 (May 19, 1980) for EPA's discussion of the toxic and carcinogenic effects of these substances.

[145] 45 FR 33107 (May 19, 1980).

[146] ZoBell, Claude E., "Sources and Biodegradation of Carcinogenic Hydrocarbons," proceedings of Joint Conference on Prevention and Control of Oil Pollution, Washington, D.C., 1971, at page 448; U.S. EPA, Report to Congress, "Listing Waste Oil As A Hazardous Waste,"

hydrocarbon content of refined oils is also somewhat limited; however, unless an oil product has been refined with processes that remove aromatic hydrocarbons (e.g., solvent washing), it can be assumed that the product will contain carcinogens similar to those found in the parent crude. In fact, since the majority of refining processes actually enrich rather than diminish the aromatic content of refined products relative to the crude oils from which they are derived, it is likely that the carcinogenic hydrocarbon content of most refined products will be at least as high or higher than that of crude oils.[147] An example of this is that the level of benzene (generally less than 100 ppm in oils) found in motor gasoline generally exceeds 10,000 ppm .[148]

The primary concern for these types of substances involves a scenario where a petroleum based product contaminates a ground

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supra note 10, at page 23-24 notes: Benzo(a)pyrene, a highly potent carcinogen, has been reported to be present in crude oil and refined oil products. Samples of crude oil from the Persian Gulf, Libya and Venezuela have been found to contain 400, 1,320 and 1,600 micrograms per kilogram, respectively, of benzo(a)pyrene. At the 10^{-6} cancer risk level, the ambient water quality criteria for protection of human health from chronic exposure is 2.8 ng/l (nanograms per liter or parts per trillion) for both benzo(a)pyrene and benzo(a)anthracene.

[147] U.S. EPA, Report to Congress, "Listing Waste Oil as a Hazardous Waste," supra note 10, at page 24.

[148] DOE, "Motor Gasolines: Winter 1979-80," (DOE/BETC/PPS-60/3), Bartlesville Energy Technology Center, Bartlesville, Oklahoma, July 1980. Benzene is known to cause leukemia and other adverse effects in humans at concentrations of 25-100 ppm. At the 10^{-6} cancer risk level, the ambient water quality criteria for the protection of human health from chronic exposure is .66 ug/l (micrograms per liter or parts per billion) for benzene.

water supply thus posing a potential threat to human health by ingestion. As will be discussed in Chapter IV, contamination of ground water is a possible result of improper disposal of oil products and, in some instances, the use of these produces to suppress dust. The two factors of importance in determining the toxic effects of oil in ground water are: (1) the types of hydrocarbons the oil contains; and (2) the solubility of these hydrocarbons in water. First, the more reactive a compound, the more likely it will be to interfere with biological functions. The relative reactivity and, hence, toxicity of the classes of hydrocarbons in oil increases from paraffins to naphthenes to olefins to aromatics.[149] For example, the Appendix VIII, "Hazardous Constituents" discussed earlier are all aromatic hydrocarbons. Second, the solubility of the hydrocarbons in water is important since if they are not soluble in water they may either never reach ground water or will not mix with it to pose a threat to humans using it. Since the water solubility of hydrocarbons also increases from paraffins to naphthenes to aromatics,[150] the aromatic portion of oil tends not only to be the most toxic, but also the most likely to migrate to ground water.

Refined oils can be of three types: (1) middle distillate fuels, which includes kerosene, diesel fuel and fuel oils No. 1 and 2; (2) lubricating oils; and (3) white oils. The middle distillate and lube

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[149] U.S. EPA "Washington State Refineries: Petroleum, Petroleum Derivatives, and Wastewater Effluent Characteristics," (EPA 600/7-78-040), March 1978, at page 85.

[150] Id. at page 47.

oils generally contain all three types of hydrocarbons and thus are potentially hazardous. White oils are lube oils from which all aromatic hydrocarbons have been removed and are thus transparent, colorless, odorless and tasteless when cold. Since the aromatic hydrocarbons are absent, these oils are relatively safe substances and are used as food additives, finishing oils, for medicinal purposes (including use as laxatives) and whenever a very pure lubricant is needed.[151]

Oil products can also pose threats to human health from dermal exposure. Squamous cell carcinoma of the hands, face and groin has occurred after chronic exposure to oils in an industrial setting, with the incidence of occurrence paralleling the degree of refining an oil underwent prior to use. It is the generally accepted position that the polycyclic aromatic hydrocarbons are responsible for the carcinogenicity of the oils involved.[152]

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[151] U.S. EPA, Report to Congress "Listing Waste Oil as a Hazardous Waste," supra note 10, at pages 26, 29 and 31. The use of white mineral oil as a component of non-food articles which come in contact with food for human consumption is covered in 21 CFR Part 178. These standards restrict oils that can be used for this purpose to white oils. The quality and quantity limitations prescribed in Part 172 for white oils are incorporated by reference in these rules for non-food articles.

[152] U.S. EPA, "A Study on the Environmental Benefits of Proposed BAETA and NSPS Effluent Limitations for the Offshore Segment of the Oil and Gas Extraction Point Category," (EPA 440/1-77-011), May 1977 at page 111. See also U.S. EPA, Report to Congress, "Listing Waste Oil as a Hazardous Waste," supra note 10, at page 31, which provides the following summary of two studies on lube oil-induced skin cancer: (1)"In Great Britain, skin cancer studies have revealed that over 86 percent of skin cancer cases that could be traced have been found to occur in association with oil exposure,

Beyond the toxic effects of oil-tainted ground water, the physical hazards of oil sheens on surface waters and the dangers of dermal exposure, the oil pollution of drinking water is also of great concern because of oil's organoleptic properties.[153] Since ground water supplies over half the population of the United States with their drinking water,[154] both Congress (in the legislative history of RCRA) and the EPA view "the potential contamination of large portions of ground water [by oil] as posing a substantial hazard to human health and the environment, within the meaning of Section 3004 of RCRA, even if the contamination results not in a direct threat to human health, but rather to the destruction of ground-water resources."[155]

As discussed previously, the toxic effects of oil on humans and other terrestrial organisms can not be quantified because oil's toxicity varies with its chemical composition; however, the concentrations at which oil renders water objectionable to drink have been quantified. The human taste is very sensitive to oil and studies indicate that a concentration between 0.005 and 0.5 pounds in 100,000 gallons of water will produce water which will be

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although the type of oil was not related to incidence."; (2)"In France, in a study conducted on 5,000 workers exposed to lubricating oils and oil aerosols, it was found that the scrotal skin cancer rate for these workers was 36 times higher than that of the general unexposed population."

[153] U.S. EPA, Report to Congress, "Listing Waste Oil as a Hazardous Waste," supra note 10, at page 33.

[154] U.S. EPA, Report to Congress, "Waste Disposal Practices and Their Effects on Ground Water," January 1977, at page ii.

[155] U.S. EPA, Report to Congress, "Listing Waste Oil as a Hazardous Waste, supra note 10, at page 34.

described as having a bad taste.[156]

Thus oil, even without the contaminates which come with use, presents a significant and detrimental threat to humans because of both its adverse organoleptic and toxic properties. In addition, since oil that has either migrated through soil or has reached ground water is subject only to anaerobic degradation, it has been estimated that the adverse effects of the oil on ground water can remain in effect for as long as 100 years.[157]

(b) The Composition of Used Oil

Used oil, like unused oil, contains an oil component that poses a potential threat to human health and the environment when improperly managed. In addition, many used oils also contain contaminants from various sources which cause them to be hazardous for reasons other than their oil component.[158] During use, the additives in lubricating oils are chemically changed or consumed, and the oil itself becomes contaminated from both internal and external sources. The primary source of internal contamination is the breakdown of the additive package, which

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[156] Id., which notes that, "It has been suggested that because petroleum is organoleptically objectionable at very low concentrations, it is unlikely that oil-polluted drinking water will pose a toxic threat to humans. This, however, has never been scientifically determined to be true."

[157] Id. at page 40.

[158] Id. at page 42.

comprises greater than 15 percent by volume of automotive oils,[159] and the subsequent interaction among its chemical components. These components may be oxidized during combustion, forming corrosive acids. External sources of contamination directly related to use include: soot and lead compounds from engine blowby; dirt and dust; metal particles from engine wear; rust; gasoline from incomplete combustion; and water from blowby vapor. External sources of contamination unrelated to use involve the mixing or dumping of materials into used oil through carelessness or ignorance. Generally, contamination by metals and polynuclear aromatics (PNA's) are primarily related to the nature of the oil, its additives and actual use, while contamination with chlorinated solvents and PCB's are primarily related to poor management practices.[160]

Appendix A to this thesis contains table 1, entitled, "Concentration of Potentially Hazardous Constituents in Used Oil," taken from a study prepared by the Franklin Associates. This table summarizes used oil contamination with respect to 19 constituents, 17 of which are included on EPA's published list of hazardous constituents.[161] This table should be used in conjunction

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[159]Mascette, G.J. and H.M. White, "Utilization of Used Oil," prepared for DOE by the Aerospace Corporation, August 1978, at page 2-5.

[160]Franklin Associates, supra note 25, at section 1, page 10; and Mueller Associates, supra note 22, at pages 18 and 20. See, infra note 281, for a brief discussion of PNA's.

[161]Franklin Associates, supra note 25, at section 1, page 11; EPA's published list of hazardous constituents can be found at 40 CFR Part 261, "Identification and Listing of Hazardous Waste," Appendix VIII "Hazardous Constituents."

with the following discussion of the contaminants typically found in used oil.

1. Concentrations of Metals in Used Oils and the Associated Hazards

The six trace metals of concern (arsenic, barium, cadmium, chromium, lead and zinc) enter used oil from several sources. Lead, which is present in much wider concentration ranges than other metals (0 to 21,700 ppm),[162] is primarily attributable to piston blowby in engines using leaded gasoline. It may also be a minor component of some antiwear or extreme pressure additives. Mixed used oils in the 1980's typically have a lead concentration between 100 and 1,200 ppm.[163] Although higher lead levels could still be found from 1979 to 1983, the period of time during which the data for table 1 was gathered, the level of lead in used oil was projected to be relatively lower in the near future because of EPA's gasoline lead phase-down standards promulgated on March 7, 1985.[164]

These standards required that lead be reduced from the previous limit of 1.1 grams per gallon to 0.5 grams per gallon by July 1985, and to 0.1 grams per gallon by January 1986. This reduction of lead in gasoline should have resulted in a concomitant reduction in the lead level of used oil; however, there were reports

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[162] Id. at page 13 notes that although the range of lead concentrations is based upon data reported from 1979 to 1983, the upper end of the range is atypical for this period and is more representative of levels found ten years prior to this period.

[163] Id. at page 13.

[164] 50 FR 9385-9399 (March 7, 1985).

in early 1987 that the lead levels in used oil had not declined as fast as EPA anticipated, and that used oil processors were still receiving large quantities of used oil with lead levels of 400 ppm to 700 ppm.[165] This was believed to be due to the fact that the large decrease in leaded gasoline use expected in response to the Agency's leaded fuel phase-out program did not take place as anticipated. The EPA in 1985 had projected reductions in the lead concentration of used oil exceeding 80 percent;[166] however, these estimates did not take into account the effects of EPA's lead banking program (under which gasoline marketers can use "banked" lead to market leaded gas which exceeds the national standard of 0.1 grams per gallon) on the present and future concentrations of lead in used oil.[167]

The health effects of lead and its compounds can be extremely serious. Lead is a chronic poison which can be absorbed by inhalation or through skin contact. Lead absorbed through the skin results in toxic effects from very small amounts.[168] The initial

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[165] Environment Reporter, Current Developments, "EPA Tentatively Denies Petitions Asking Delay of Used Oil Burning Rule Lead Limit," January 30, 1987, at page 1662.

[166] 50 FR 49164-49211 (November 20, 1985).

[167] Mueller Associates, supra note 22, at page 22.

[168] Id. at page 143. For extensive discussions of the biological effects of lead exposure see U.S. EPA, "Air Quality Criteria for Lead," Second Review Draft, EPA-600/8-83-028B, Washington, D.C., September 1984; and National Academy of Sciences, "Lead in the Human Environment," Washington, D.C., 1980. The EPA report indicates that environmental lead exposure is a major health problem in this country. EPA has found that a small but significant portion of the urban adult population and up to 25 percent of the children in urban areas are overexposed to lead, and that the effects of lead are being seen at the subcellular level of organellar structures and processes as well as the overall level of general functioning that encompasses all systems of the body.

symptoms of lead poisoning include fatigue, aching bones and muscles, headaches and abdominal pains. The cumulative effects of an extended exposure period to even minute quantities of lead[169] include: affects to the central nervous system resulting in severe headaches, convulsions, coma and possibly death; hemolysis of red blood cells; and lesions of the male gonads and blood vessels. Exposure to sufficient quantities of lead can damage the liver and kidneys which can also result in death.[170]

The ecological effects of lead include contamination of vegetation exposed to airborne particles of lead. If these plants are then used for forage or fodder, their lead content may enter the food chain.[171] Lead is also known to be toxic to aquatic organisms, with the degree of toxicity depending on such variables as water temperature and alkalinity.[172]

The other five trace metals typically present in used oil usually occur at lower concentrations than lead.[173] Barium

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[169] U.S. EPA, Report to Congress, "Listing of Used Oil as a Hazardous Waste," supra note 10, at page 67, notes that, "It is believed that the human intake rate at which lead accumulation begins to exceed excretion is about 1 mg/day. However, chronic ingestion of .1 mg/day over several years has been reported to cause lead poisoning."

[170] Id. at page 66 and 67; and Mueller Associates, supra note 22, at page 143.

[171] Teknekron, Inc., "Technical, Economic, and Environmental Assessment of Waste Oil Recovery and Disposal," Volume I, prepared for the Ontario Ministry of Transportation and Communications, March 1976, at page 160.

[172] U.S. EPA, "Quality Criteria for Water," supra note 143, at pages 84-85.

concentration in used oil typically ranges from 50 to 500 ppm; however, levels up to 3,906 ppm have been reported. Cadmium concentrations typically range around 2.0 ppm, and levels above 10 ppm are rare. Chromium concentration is generally higher than cadmium, with typical levels ranging from 3.0 to 30 ppm. The study found arsenic in only 25 percent of the samples; however, the concentrations were significant when detected, with typical levels between 5 and 25 ppm. Zinc Concentration are typically high in used oils, ranging from 100 to 1,200.[174]

The source of barium[175] and zinc is primarily various additive packages included in commercial motor oil. Cadmium and chromium (which as noted above occur only in trace amounts) enter the used oil primarily as a result of engine wear; however, some additives may also contain these metals. The source of arsenic in used oil has not been determined.[176]

The health effects of the ingestion of soluble barium compounds include: severe gastrointestinal distress; muscular

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[173]Franklin Associates, supra note 25, at section 1, page 12 (table 2) (Appendix A, table 1 of this thesis) and pages 13 and 14.

[174]Id. at page 14, notes that the techniques used for arsenic analysis were reported to significantly influence percent detection and measured concentration, and for this reason, scientists believe arsenic may be present more frequently than the data suggest.

[175]Richard J. Bigda and Associates, "Review of All Lubricants Used in the U.S. and Their Re-refining Potential," prepared for DOE, June 1980, at page 25 notes that barium derives from detergent/dispersant additives, which make up 6.9 percent by volume of SE quality multigrade motor oil.

[176]Id. at page 13.

paralysis and constriction; bladder contraction; and increased voluntary muscle tension. There are documented incidents of fatalities from inhalation of barium oxide, and from the ingestion of barium carbonate.[177] The fatal dose of barium for humans is reported to be 550-600 mg.[178]

Cadmium compounds are extremely toxic and may be fatal when ingested or inhaled. In general, ingestion is less dangerous than inhalation because when ingested little absorption is likely to occur due to rapid elimination by vomiting. Inhalation of cadmium compounds can be very toxic, and produces accumulation in the kidneys, liver, pancreas and thyroid. The initial exposure to cadmium fumes or dust can cause irritation of the upper respiratory tract followed by coughing, chest pains, sweating and chills. Prolonged exposure can cause pulmonary and renal effects, and sometimes death.[179] In addition, since cadmium is taken up from the soil by plant roots, foods grown in cadmium contaminated soils or irrigated with cadmium polluted water can accumulate sufficient quantities of the metal to pose a human health hazard.[180] Cadmium also has adverse effects on certain fish species at levels of less than one microgram per liter.[181]

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[177] U.S. EPA, Report to Congress, "Listing of Waste Oil as a Hazardous Waste," supra note 10, at page 67; and Mueller Associates, supra note 22, at pages 143 and 144.

[178] U.S. EPA, "Quality Criteria for Water," supra note 143, at page 19.

[179] U.S. EPA, Report to Congress, "Listing of Waste Oil as a Hazardous Waste," supra note 10, at page 69; and Mueller Associates, supra note 22, at page 144. The estimated fatal dose of inhaled cadmium to humans is about 50 mg/cubic meter.

[180] U.S. EPA, "Quality Criteria for Water," supra note 143, at page 31.

Chromium when incinerated oxidizes to hexavalent chromium, thus rendering potentially hazardous all chromium-containing wastes that are burned. Hexavalent chromium compounds are highly toxic when ingested, inhaled, or applied to the skin. These compounds affect the skin, nasal tissues, lungs and kidneys, and long-term exposure to a high concentration can cause cancer of the respiratory tract.[182] Low levels of hexavalent chromium (.03-64 ppm) inhibit algae growth, with significant adverse effects on fish being observed at .2 mg/liter.[183] In addition, although natural soil contains some chromium (40 ppm, mean), additions of even small amounts (5-50 ppm) have been shown to damage vegetation.[184]

2. Concentrations of Chlorinated Solvents in Used Oils and the Associated Hazards

Chlorinated solvents are a major group of contaminants in used oil. The five chlorinated solvents commonly detected in used oil are: dichlorodifluoromethane; trichlorotrifluoroethane; 1,1,1-trichloroethane; trichloroethylene; and tetrachloroethylene.[185] The

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[181] Id. at page 29-30.

[182] U.S. EPA, Report to Congress, "Listing of Waste Oil as a Hazardous Waste," supra note 10, at page 68; and Mueller Associates, supra note 22, at page 144.

[183] EPA, "Quality Criteria for Water," supra note 143, at page 40.

[184] U.S. EPA, Report to Congress, "Listing of Waste Oil as a Hazardous Waste," supra note 10, at page 68.

[185] Franklin Associates, supra note 25, at section 1, page 12 (table 2), and page 14.

range of concentrations of chlorinated solvents identified in used oil is from less than one to several thousand ppm.[186]

Up until recent years these chlorinated solvents were derived primarily from two sources: (1) additive package breakdown; and (2) the addition of chlorine and bromine (both are halogens) as lead scavengers to leaded gasoline; however, as lead is phased out of gasoline, these chlorine and bromine additives should become lower, thus, reducing halogen levels.[187] As a result of the reduction of the halogen levels due to the decreasing use of chlorine and bromine as lead scavengers, the principal source of chlorinated solvents is becoming the indirect introduction of these substances into collected used oil by the careless or ignorant management practices of generators and collectors. An example of these practices is the dumping of degreasing solvents into tanks used for storing used automotive oils.[188]

Used oils collected from metalworking activities also contain high levels of chlorine which can lead to significant emissions of chlorinated hydrocarbons when these oils are burned. The chlorine in these oils is derived from their enhanced extreme pressure additive packages which may contain as much as 18 percent active chlorine.[189]

An often used method of assessing the presence of chlorinated

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[186] See Appendix A, table 1.

[187] Mueller Associates, supra note 22, at pages 22 and 23.

[188] Id. at page 23; and Franklin Associates, supra note 25, at section 1, page 14.

[189] U.S. EPA, Report to Congress, "Listing of Waste Oil as a Hazardous Waste," supra note 10, at page 55.

solvents is to measure total chlorine.[190] Although chlorine can be present in other forms, such as inorganic salts, this measure is an indicator of the contamination by potentially hazardous chlorinated substances.[191] The data indicates that typical chlorine concentrations range from 1,000 to 5,000 ppm; however, chlorine contents have been measured at over 40 percent of the oil by weight. The extremely high chlorine contents detected in the Franklin and other studies are the result of mixing of the used oil with chlorinated solvents or the presence of metalworking oils in significant quantities.[192]

When hydrocarbons, like benzene and naphthalene (which are contained in petroleum) are exposed to significant levels of halogens (such as chlorine and bromine), halogenated hydrocarbons (e.g., chlorinated benzenes and chlorinated naphthalenes) may be formed.[193] Both of these compounds are toxic when ingested or inhaled. Chlorinated naphthalenes are also toxic when applied to the skin, and can produce skin lesions and acute liver atrophy. These compounds also emit toxic fumes when heated to decomposition, and may react with oxidizing materials.[194]

The hazards associated with 1,1,1-trichloroethane include adverse effects in the central nervous system, pulmonary system,

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[190] See Appendix, A table 1.

[191] Franklin Associates, supra note 25, at section 1, page 14.

[192] Mueller Associates, supra note 22, at page 23.

[193] U.S. EPA, Report to Congress, "Listing of Waste Oil as a Hazardous Waste," supra note 10, at page 50.

[194] Id. at page 65.

heart, kidney and liver of animals.[195] Results of a National Cancer Institute (NCI) carcinogenesis bioassay have indicated that this compound is not carcinogenic to humans; however, oral administration of 1,1,1-trichloroethane did produce a variety of neoplasms, and a high incidence of premature deaths.[196] Because of the serious concerns about the hazards of this compound, NCI is retesting it.[197]

Trichloroethlene is a potential human carcinogen. Initial exposure to its vapor can cause irritation of the eyes, nose and throat. Acute exposure can cause some liver and kidney damage. It can also depress the control nervous system and can result in headaches, nausea, dizziness, fatigue and intoxication.[198] Unconsciousness and death have also been reported.[199]

Tetrachloroethylene is a potential human carcinogen. Initial contact can cause a dry, scaly and fissured dermatitis, and acute exposure can result in central nervous system depression, hepatic injury and anesthetic death.[200] Tetrachloroethylene can also lead to impaired liver function, and it has been identified as a mutagen in bacterial assays. It has also been identified as chronically toxic to dogs, causing kidney and liver damage.[201]

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[195] 50 FR 49258-49270 (November 29, 1985).

[196] Mueller Associates, supra note 22, at page 145.

[197] 50 FR 49258-49270 (November 29, 1985).

[198] Id.

[199] Mueller Associates, supra note 22, at page 145.

[200] Id.

[201] 50 FR 49258-49270 (November 29, 1985).

3. Concentrations of Other Organic Materials in Used Oil and the Associated Hazards

The general category of "other organic materials" (used in Appendix A, table 1) includes: aromatic solvents (consisting of benzene, toluene and xylenes); polynuclear aromatic (PNA) compounds (consisting of benz(a)anthracene and benzo(a)pyrene); and polychlorinated biphenyls (PCB's). Except for PCB's, used oils typically contain contaminants of this group.[202] The Franklin study also detected PCB's in 18 percent of the samples analyzed.[203]

Aromatic solvents are in used oils because of the inherent properties of the oil, oil use and mixing with spent solvents.[204] They are also generally added to improve the performance characteristics of many petroleum-derived oils.[205] Toluene and xylene typically range from 500 to 5,000 ppm; however, levels above 10,000 have been measured. Benezene concentrations are much lower and typically range from 100 to 300 ppm.[206]

Benzene is a hazard to humans primarily through exposure by inhalation of the vapor or through skin absorption. It is a proven carcinogenic in rats, and a relationship between benzene exposure and leukemia has been suggested by several case reports as well as an epidemiological case control study.[207] Acute exposure to benzene

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[202] Franklin Associates, supra note 25, at section 1, page 14.

[203] Id. at page 12 (table 2); see, Appendix A, table 1.

[204] Id. at page 15.

[205] Mueller Associates, supra note 22, at page 23.

[206] Franklin Associates, supra note 25, at section 1, page 15.

[207] Mueller Associates, supra note 22, at page 145; see also, U.S.

results in the depression of the central nervous system, headache, dizziness, convulsions and coma. Chronic poisoning usually produces damage to the blood forming tissues and changes in the body organs including the lymph nodes. Benzene can also induce chromosomal aberrations in humans and, sometimes, death.[208]

Currently toluene is not considered to be a serious health problem by the EPA; however, the EPA did note a recent Italian study involving oral ingestion (at a single dose level) in one rat species that appeared to show a greater incidence of tumors involving a number of organ sites.[209] As with many solvents, toluene can cause skin damage as a result of dermal exposure; however, serious effects are not likely except in gross exposure incidents.[210]

As discussed in the earlier subchapter on the composition of unused oil, PNA's as a class are toxic, and many are potent carcinogens as well.[211] In addition, SO_2 which is present in the

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Department of Health and Human Services, "Third Annual Report on Carcinogens," Public Health Services, Washington, D.C., December 1982.

[208] Mueller Associates, supra note 22, at pages 145 and 146.

[209] 49 FR 22195 (May 25, 1984).

[210] Mueller Associates, supra note 22, at page 146.

[211] U.S. EPA Report to Congress, "Listing of Used Oil as a Hazardous Waste," supra note 10, at page 47; see also Mueller Associates, supra note 22, at page 147, which summarizes current studies as follows: "Benzo(a)pyrene is considered an active carcinogen. It is also suspected to be a mutagenic and teratogenic agent in mice. For example, 50 to 100 ppm doses administered for 122 to 197 days have produced stomach tumors in mice. A single oral dosage of 100 mg produced mammary tumors. Lung cancer was also observed when

vapor produced when used oil is burned is considered to have a synergistic effect on PNA-induced carcinogenesis.[212] The concentration of two PNA's, benzo(a)pyrene and benzo(a)anthracene, range from below detection levels to several hundred ppm; however, typical levels are from 5 to 20 ppm and from 10 to 50 ppm, respectively.[213] Naphthalene, another PNA, was found by the Franklin study in every used oil sample taken at much higher levels (110 to 1,400).[214] PNA's are present in virgin oils, but they are known to concentrate in used automotive lubricating oils, apparently coming from gasoline or diesel fuel and their combustion products.[215] The National Bureau of Standards (NBS) uses benzo(a)pyrene as an indicator of total PNA content and, according to an NBS analysis, the benzo(a)pyrene levels in used motor oils may be as much as 900 times greater than those found in unused motor oil basestocks.[216]

PCB's were only detected in 18 percent of the Franklin study

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the mice were exposed to benzo(a)pyrene and SO_2; SO_2, by itself, did not produce any carcinomas in the mice. In addition, skin cancers have been induced in a variety of animals injected with low levels of benzo(a)pyrene."

[212] Teknekron, "Technical, Economic, and Environmental Assessment of Waste Oil Recovery and Disposal," supra note 171, at page 174.

[213] Franklin Associates, supra note 25, at section 1, page 15.

[214] Id.; see also Appendix A, table 1.

[215] U.S. EPA, Report to Congress, "Listing of Used Oils as a Hazardous Waste," supra note 10, at page 47.

[216] Id. at page 47; this NBS analyses is summarized in Recon Systems, Inc. and ETA Engineering, Inc., "Used Oil Burned as a Fuel," draft report prepared for EPA, November 1980, at section VII pages 28-30.

samples, with the detected concentrations ranging from 0 to 3,800 ppm and the majority of the samples showing levels below 50 ppm;[217] however, it is important to note that of the 753 samples analyzed, ten percent may have had levels above 50 ppm and several samples were identified with more than 100 ppm.[218]

The presence of PCB's in used oil depends on the source of the oil and the material and containers with which it comes into contact during handling.[219] Automotive oils of the present day are generally free of PCB's;[220] however, until the early 1970's, small amounts of PCB's were added to certain automobile transmission fluids to enhance controlled swelling of rubber seals.[221] Transmission fluids from older automobiles may still be a source of low level PCB contamination in used automotive oils because when the manufacture of PCB-containing hydraulic fluids was discontinued it was recommended that hydraulic systems not be drained, flushed or refilled.[222] Instead, the public was advised to replace such fluids with non-PCB-containing hydraulic fluids as leaks and spills occurred; thus, as a result, PCB levels in many hydraulic systems can still range from 60 to 500,000 ppm.[223] An additional problem is the extreme complexity of hydraulic systems which makes it very

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[217] See, Appendix A, table 1.

[218] Franklin Associates, supra note 25, at section 1, page 15.

[219] Id. at section 3, page 31.

[220] Id.

[221] Id.; and U.S. EPA, Report to Congress, "Listing Used Oil as a Hazardous Waste," supra note 10, at page 50.

[222] Id.

[223] Franklin Associates, supra note 25, at section 3, page 31.

difficult to eradicate all PCB contamination from these systems.[224]

It is also reported by collectors, processors and re-refiners that industrial used oil commonly has PCB concentrations of five to ten ppm.[225] The probable sources of this contamination is old hydraulic and electrical oils which contained PCB's.[226]

The EPA's Carcinogen Assessment Group identified PCB's as exhibiting substantial evidence of carcinogenicity.[227] PCB's are also highly toxic, and can be absorbed through the lungs, skin and gastrointestinal tract.[228] Because PCB's are inert and persistent, they have a tendency to accumulate in waterways and to bioaccumulate in fish. Levels as low as one ppb may adversely affect aquatic insects and crustaceans.[229] It has also been

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[224] U.S. EPA, Report to Congress, "Listing Used Oil as a Hazardous Waste," supra supra note 10, at page 58.

[225] Franklin Associates, supra note 25, at section 3, page 31.

[226] U.S. EPA, Report to Congress, "Listing of Used Oil as a Hazardous Waste," supra note 10, at page 50; and Franklin Associates, supra note 25, at section 3, page 32.

[227] 45 FR 79339 (November 28, 1980).

[228] U.S. EPA, Report to Congress, "Listing of Used Oil as a Hazardous Waste," supra note 10, at pages and 64, which notes that "Skin lesions have developed among workers exposed to air containing PCB's at levels as low as .1 mg/cubic meter." See also, Mueller Associates, supra note 22, at page 147, which states, "Exposure to PCB's can cause acute respiratory tract irritation, and liver damage. Skin lesions have also developed among workers exposed to air containing low levels of PCB's. In addition, carcinogenic responses have been reported in rats and mice. Studies of accidental oral ingestion show that PCB's are embryotic, causing stillbirth and increased eye discharge in children born to women exposed to PCB's during pregnancy."

[229] U.S. EPA, Report to Congress, "Listing of Used Oils as a Hazardous Waste," supra note 10, at page 64.

demonstrated that concentrations as low as .1 ppb depress photosynthesis in phytoplankton and retard its rate of cell growth and division.[230]

4. Concentration of Priority Pollutants in Used Oils

In 1983, the EPA carried out a used oil sampling and analysis program to supplement the data obtained from other sources.[231] This program took approximately 350 samples; however, analytical results were only available for about two-thirds of the samples due to various reasons such as bottle breakage, or a very high water content.[232] This study selected 49 used oil samples and analyzed them for priority pollutants, including acid and base/neutral compounds, pesticides and other listed hazardous compounds.[233] The analysis detected many priority pollutants in each type of oil.[234] Nearly 100 specific priority pollutants were detected in at least one of the 49 samples.[235] Appendix A, table 2 provides a summary of this study for some frequently detected priority

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[230] Id.

[231] "U.S. EPA Used Oil Sampling and Analysis Program," 1983 and 1984, sample analysis performed by ERCO, Inc. with data analysis by Franklin Associates, Ltd.

[232] Franklin Associates, supra note 25, at section 1, page 15.

[233] Id. at page 16.

[234] Id. at section 3, page 44.

[235] Id. at section I page 18; see, Id. at section 3, pages 45-52 (tables 26a-h) for a complete listing of all of the contaminants detected in each oil type and their concentrations.

pollutants in used oil.

Generally, the study indicated that the major base/neutral compound contaminants found in automotive oils are similar to those found in industrial oils and mixed oils, and that overall industrial hydraulic and metalworking oils have substantially lower levels of these priority pollutants than automotive oil.[236] Approximately 50 priority pollutants other than base/neutral and acid compounds were detected in one or more oil samples, with automobile oils again being more highly contaminated than industrial hydraulic and metalworking oils. The higher levels found in the automotive oils are attributed primarily to contamination by gasoline compounds or their derivatives.[237]

5. Physical Properties of Used Oil

Several of the physical characteristics of used oil are important with respect to the dispersion of the oil and its contaminants into the environment including: flash point; bottom sediment and water; water only; viscosity; and gravity (density).[238] These characteristics, which are summarized in Appendix A, table 3, can vary greatly depending upon many factors including the characteristics of the virgin oil and its use, as well as the collection and handling process associated with the used oil.[239] The

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[236] Id at section 3, page 44.

[237] Id. at page 53.

[238] Id.; see, Appendix A, table 3, for a summary of the miscellaneous physical characteristics of used oil samples.

flash point of a used oil also affects greatly how hazardous the used oil product is, especially since most end users typically do not know the level of this characteristic.

Appendix A, table 4, which summarizes the measured flash points of 289 used oil samples, shows that the flash point of used oil can range between 60° F and 525° F compared to virgin oil's 100° F to 400° F. Although not shown in table 4, nearly seven percent of the oil samples analyzed had a flash point below 100° F.[240] Almost 28 percent of the used oil samples measured had a flash point below 140° F. This is very significant since Subpart C of Part 261 of 40 CFR "Criteria for Listing a Hazardous Waste" classifies a waste as hazardous if it "has a flash point less than 60° C (140° F)." The lower flash points of some used oil is probably due to the presence of highly-ignitable chlorinated materials and organic solvents such as benzene, toluene and xylenes from engine blowby.[241] Contamination of used oil by even small amounts of these low flash point compounds can reduce the used oil's flash point, which is normally greater than 200° F, to levels lower than 100° F.[242]

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[239] Mueller Associates, supra note 22, at page 25.

[240] Id. at page 27.

[241] Id. at pages 25 and 27.

[242] Id. at page 27.

IV. END-USES OF USED/RECYCLED OIL AND THE ASSOCIATED HEALTH AND ENVIRONMENTAL CONCERNS

A 1983 study indicated that of the approximately 1.2 billion gallons of used oil generated that year, 662 million gallons (about 57 percent of the total generated) was sold by the collectors, processors and fuel oil dealers into the U.O.M.S.[243] The majority of the used oil, 486 million gallons or 73 percent of the total, entering the U.O.M.S. was sold for use as a fuel in boilers, heaters and furnaces. About nine percent (63 million gallons) of the used oil in the U.O.M.S. is re-refined into lubricants, six percent (40 million gallons) is sold for road oiling and five percent (35 million gallons) goes to non-fuel industrial uses such as asphalt extenders, flotation oils and form oils.[244] See Appendix A, table 5 for a summary of end-uses for used oil during 1983.

Only 42 million gallons (six percent) of the used oil entering the U.O.M.S. is disposed to the environment. There is no reported dumping of used oil once in the U.O.M.S. Most of the end-uses within the U.O.M.S., listed above, are comparatively much more desirable than the majority of end-uses of the 537 million gallons of oil not entering the U.O.M.S. which are estimated to be as follows: burning - 100 million gallons; road oiling - 29 million gallons; recovery for reuse on

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[243] Franklin Associates, supra note 25, at section 5, page 2 (table 45).

[244] Id. and Temple, Barker and Sloane, supra note 72, at section III, pages 5 and 10.

site by industrial generators - 44 million gallons; disposal - 123 million gallons; and dumping - 241 million gallons.[245] About one-half of all dumping is performed by DIYers, with the other half by large off-road vehicle operators such as farmers, miners and construction workers.[246]

(a) Burning Used Oil as Fuel

Since used oil has approximately the same heating value as virgin petroleum fuel (15,000 to 20,000 Btu/lb),[247] a high price for virgin fuel oil can make used oil an economically attractive fuel supplement. In 1983 almost 600 million gallons of used oil were burned as fuel, with approximately 486 million gallons passing through the U.O.M.S. and 100 million gallons burned at the site of generation.[248] Thus, almost half of all used oil generated in the United States is burned as fuel in various types and sizes of boilers, small oil space heaters, incinerators, asphalt plants, cement kilns and diesel engines. Basically any facility designed to burn No. 6 fuel

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[245] Franklin Associates, supra note 25, at section 5, pages 1 and 2 (table 45); and Temple, Barker and Sloane, supra note 72, at section III, page 6 and table III-2.

[246] Franklin Associates, supra note 25, at section 5, page 3.

[247] National Bureau of Standards Special Publication 674. Proceedings, Conference on Measurements and Standards for Recycled Oil - IV, Held at NBS, Gaitersburg, MD, September 14-16, 1982, "The Fate of Hazardous Wastes in Used Oil Recycling," Presentation of Dennis W. Brinkman, DOE/BETC, and Paul Fennelly and Norman Suprenant of GCA Corporation, at page 20.

[248] Temple, Barker and Sloane, supra note 72, at section III, page 6 and table III-2.

oil (and most facilities designed to burn No. 4 or No. 5 fuel oils) can burn straight used oil although modifications may be necessary in systems designed for the lighter fuels.[249]

In the usual situation used oil is blended with virgin fuel before burning. Blended fuel oil products typically contain five to 20 percent used oil (small boilers usually burn an average blending ratio of one part used oil to nine parts virgin oil)[250] and can be burned in virtually any type boiler if the virgin fuel fraction is No. 3 fuel oil or lighter. The practice of blending used oil with No. 3 oil and burning the blend in small and medium size residential and commercial boilers is common in some locations, particularly the northeast.[251] Blending of used oil with virgin oil occurs at either the processing facility, the boiler or at a virgin fuel oil dealer, and in general improves the oil quality by diluting the quantity of contaminants.[252]

Another significant end-use of used oil involving burning is its use in oil space heaters. Oil space heaters are small heaters primarily used by automobile service stations, automobile and truck dealerships, fleet operators, automotive repair shops and farm operators.[253] In 1983 it was estimated that over 34 million gallons of the used oil which did not enter the U.O.M.S. was burned in these

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[249] U.S. EPA, "A Risk Assessment of Waste Oil Burning in Boilers and Space Heaters," Final Report prepared for the Office of Solid Waste under Contract No. 68-02-3173, January 1984, at section 3, page 1.
[250] Temple, Barker and Sloane, supra note 72, at section III, page 7.
[251] Franklin Associates, supra note 25, at section 5, page 3.
[252] Temple, Barker and Sloane, supra note 72, at section III, page 7.
[253] Id. at page 8.

oil space heaters.[254] Oil utilized in this manner receives no form of processing or emission control and can present significant health and environmental risks.

Many of the hazards associated with the contaminants and other components of waste oil were addressed in Chapter III. It is now necessary to address the point where the nature and degree of health and environmental hazards associated with these substances depends primarily on the end-use of the used oils. The substances of primary concern found in used oil include heavy metals, particularly lead; organic solvents such as benzene, xylene, and toluene; and chlorinated organics such as trichloroethane, trichloroethylene, and polychlorinated biphenyls (PCB's). A significant number of the contaminants commonly found in waste oil are either toxins or carcinogens and are therefore potentially hazardous.[255]

When used oil is burned as a fuel, or for the purpose of thermal disposal, its contaminants may enter the atmosphere.[256] It has been estimated that 20 to 100 percent of the lead in used oil entering a steam boiler (with or without a virgin fuel) can be expected to be emitted from the stack, with most of the remainder being deposited on tubes and elsewhere in the combustion furnace. These furnace deposits may be emitted during sootblowing, when and if this

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[254] Franklin Associates, supra note 25, at section 5, page 2 (table 45).

[255] U.S. EPA, "A Risk Assessment of Waste Oil Burning in Boilers and Space Heaters," supra note 249, at section 2, page 1.

[256] U.S. EPA, Report to Congress, "Listing Waste Oil as a Hazardous Waste," supra note 10, at page 73.

procedure is used, or they may eventually be removed during furnace and boiler cleaning.[257]

Used oil burned as fuel emits 76 to 79 percent of the lead and three to 51 percent of the barium in particles less than a micron in size.[258] These submicron size emissions remain suspended in the atmosphere longer than larger particles and thus have a wider dispersion range. Submicron emissions are also a far more serious health concern since they tend to penetrate more deeply into the respiratory tract and are retained there for longer periods of time.[259]

To date the environmental impacts of burning waste oil have not been fully assessed and so very little data is available on the burning emissions of organic contaminants and trace metals, other than lead, contained in used oil; however, it is suspected that trace metals behave similarly to lead with regard to stack emissions.[260] The studies[261] which have been conducted to measure lead

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[257] Recon Systems, Inc., and ETA Engineering, Inc., "Used Oil Burned as a Fuel," draft report prepared for EPA, November 1980, at section 4, page 3.

[258] Chansky, Steven, et all., "Waste Automotive Lubricating Oil Reuse as a Fuel," prepared for EPA, September 1974, at page 81.

[259] Teknekron, "Technical, Economic, and Environmental Assessment of Waste Oil Recovery and Disposal," supra note 171, at page 141.

[260] U.S. EPA Report to Congress, "Listing of Waste Oil as a Hazardous Waste," supra note 10, at page 73; see also, U.S. EPA, "Risk Assessment of Waste Oil Burning in Boilers and Space Heaters," supra note 249, at section 2, pages 3-4.

[261] See, Waite, D.A., et al. "Waste Oil Combustion: An Environmental Case Study." APCA Paper No. 82-5.1. Presented at Annual Meeting of Air Pollution Control Association, New Orleans, June 20-25, 1982,

emissions from a source burning waste oil indicate that they are significantly greater than those from a source burning fuel oil. Studies using modeling[262] to predict ambient concentrations of lead from a source burning waste oil have reached the same results. These studies indicate that the impact of waste oil burning on ambient air depends on many factors including: number of sources, emission control equipment, stack heights, meteorological conditions, background levels and the waste oil itself. The available data indicates that ground-level concentrations can approach or exceed the National Ambient Air Quality Standard (NAAQS) for lead; therefore, the burning of waste oil containing lead may pose a human health hazard, at least under some conditions.[263]

The available data indicates that lead emissions resulting from the burning of waste oil at single point sources accounts for local airborne concentrations from 0.203 to 0.314 micro grams per cubic meter, or 14 to 21 percent of the NAAQS for lead. The lead

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pages 1-15; Brinkman, D.W., P. Fennelly, and N. Suprenant. "The Fate of Hazardous Wastes in Used Oil Recycling." GCA Corporation, July 1983; and Walker, W. B., Environmental Pollution Management, "Pollution of the Environment by Burning of Waste Oils." 11(3): 80-82, May/June 1981.

[262]See, Waite, "Waste Oil Combustion: An Environmental Case Study," supra note 261; Recon Systems, Inc., and ETA Engineering, Inc. "Used Oil Burned as a Fuel." Volumes 1 and 2. October 1980; and Devitt, T., et. al. "Population and Characteristics of Industrial/Commercial Boilers in the U.S.," EPA-600/7-79-178a, August 1979.

[263]U.S. EPA, "A Risk Assessment of Waste Oil Burning in Boilers and Space Heaters," supra note 249, at section 2, page 4.

standard is provided to protect against encephalopathy (brain disease) and renal damage. Emissions from multiple sources or high-density urban areas are believed to produce airborne lead concentrations of 0.665 to 0.708 micrograms per cubic meter, or 44 to 47 percent of the NAAQS for lead. This data indicates that emissions from waste oil burning could account for at least ten percent of the airborne lead concentrations in high-density urban areas.[264] It must be noted that because lead controls have been applied with varying degrees of success since the majority of the available data was compiled, airborne lead concentrations may now be significantly lower.[265]

It is generally accepted that lead from commercial boiler systems is the trace element of most concern, particularly since repeated experiments and mass flow calculations indicate that 50 to 60 percent of the lead introduced into commercial boilers exits from the system in flue gas streams.[266] Additional elements of possible concern, depending upon their concentrations in the used oil, include iron and zinc. Other metals, including arsenic, cadmium and chromium are generally present at such very low concentrations in the stack gas that when diluted in the atmosphere they should not cause major problems; however, this situation is still of some

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[264] Id.

[265] As of July 1983 the lead in leaded gasoline was limited to 1.1 g/gal.

[266] Mueller Associates, supra note 22, at page 91. This conclusion is based primarily upon data produced by GCA Corporation in its report titled "The Fate of Hazardous and Nonhazardous Waste in Used Oil Disposal and Recycling," Report No. DOE/BC/10375-6, for U.S. DOE, October 1983.

concern since the concentration of these metals can be substantially higher if the used oil feedstocks contain higher levels than those used in tests to date.[267]

Generally studies[268] have shown that lead emission from used oil combustion can be controlled. In a test conducted at Northern States Power, less than .2 percent of the lead in used oil fired with coal in a boiler equipped with an electrostatic precipitator was emitted to the atmosphere, while in another test only .03-.05 percent of the lead in a waste-oil-fired suspension preheater cement kiln equipped with electrostatic precipitators was emitted.[269]

Although data on the environmental impact from other metals and organic contaminants which are produced by the burning of waste oil is far more limited, a small number of studies have concluded that there is a potential for adverse effects from both organic contaminants and from trace metals other than lead.[270] In particular, modeling results have indicated that the waste oil constituents barium and hydrogen chloride may have a substantial

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[267] Id.

[268] GCA Corporation, "The Fate of Hazardous and Nonhazardous Waste in Used Oil Disposal and Recycling," Report No. DOE/BC/10375-6, for U.S. DOE, October 1983; GCA Corporation, "Waste Automotive Lubricating Oil as a Fuel," Report No. PB-241357, for U.S. EPA September 1974; and Recon Systems, Inc. and ETA Engineering, Inc., "Used Oil Burned as a Fuel," Report for the U.S. EPA, 1980.

[269] Mueller Associates, supra note 23, at page 87.

[270] U.S. EPA, "A Risk Assessment of Waste Oil Burning in Boilers and Space Heaters," supra note 249, at section 2, page 4.

impact on air quality when viewed in relation to their corresponding environmental exposure limits (EEL).[271] Barium emissions are of significant health concern because barium increases the excitability of muscles, particularly the cardiac muscle.[272] The principle health effect of hydrogen chloride is irritation.[273] Waste oil constituents such as barium, hydrogen chloride and lead are considered threshold (noncarcinogenic) contaminants since they have significant health effects at certain concentrations and are thus dealt with quite differently from nonthreshold (carcinogenic) contaminants for which there is believed to be no acceptable level of exposure.[274]

Dispersion modeling of barium emissions from single point sources have indicated that local airborne concentrations of barium compounds can reach .098 to .153 micrograms per cubic meter, or 23 to 36 percent of the EEL. Modeling results of barium emissions from multiple point sources and high-density urban areas indicate that airborne concentrations of barium from waste oil burning may reach 75 to 79 percent of the EEL. These modeling results indicate that barium emissions from waste oil burning appear to account for at least 16 percent of the airborne concentration of barium in high-

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[271] Id. at section 5, page 1.

[272] Id. at page 3.

[273] Id.

[274] Id. at pages 1 and 5. The threshold contaminants considered in EPA's risk assessment dispersion modeling analyses included: barium; cadmium; chromium; lead; zinc; 1,1,1,-trichloroethane; toluene; and hydrogen chloride. The nonthreshold contaminants included: arsenic; chromium; 1,1,2-trichloroethane; tetrachloroethylene; trichloroethylene; carbon tetrachloride; PCB's; and dioxins.

density urban areas.[275]

Dispersion modeling of hydrogen chloride emissions from single point sources indicates that airborne hydrogen chloride concentrations could occur at 1.66 to 2.58 micrograms per cubic meter, or between 3 to 4 percent of the EEL. Hydrogen chloride emissions from multiple point sources and high-density urban areas indicate that they can reach concentrations of 5.45 to 5.80 micrograms per cubic meter. Thus these modeling results mean that nine to ten percent of the hydrogen chloride EEL for these areas may be reached as a result of waste oil burning.[276]

The EPA in its 1984 risk assessment of waste oil burning in boilers and space heaters concluded that "modeling results show that concentrations of barium, hydrogen chloride, and lead from the burning of waste oil in small or medium-size boilers or space heaters has a measurable impact on air quality and that waste oil burning may account for a significant portion of the existing ambient airborne concentrations of each of these substances."[277] The risk assessment also concluded that the waste oil constituents, chromium, arsenic and cadmium presented potentially unacceptable cancer risks (one additional cancer per one million people) when waste oil was burned in a high-density urban area (assuming 97 percent destruction removal efficiency for organics and the emission of 75 percent of the metals in the oil).[278] The EPA's

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[275] Id.

[276] Id. at section 5, pages 4-5.

[277] Id.

[278] Id. at pages 5-8 and tables 5-2 and 5-4.

modeling also indicated that if its underlying assumptions are correct, cancer risk from dioxin formation during combustion of waste oil may be potentially significant in some cases.[279]

Most used oil passing through the U.O.M.S. receives some degree of processing by minor or major processing technologies which helps to control these emissions with varying degrees of success. In addition, the overall environmental impacts of burning used oil depends upon many factors, in particular the following:

(1) Concentration of hazardous contaminants in the oil;
(2) Burner design;
(3) Emissions control equipment;
(4) Stack height;
(5) Meteorological conditions; and
(6) Number of emitting sources within an area.[280]

It must also be noted that many undesirable emissions such as polynuclear aromatics (PNA)[281] from boilers burning waste oil are similar to those resulting from the burning of virgin oils.[282] In the case of PNA's, as with many other substances, the similarity is due

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[279] Id. at section 6, pages 1-27. It must be noted that EPA has only extremely limited evidence that chlorinated dibenzodioxins (PCDD's) and polychlorinated dibenzofurans (PCDF's) are formed by the burning of waste oils. There is also considerable question about their toxic and carcinogenic effect on humans.

[280] Franklin Associates, supra note 25, at section 5, page 4.

[281] Id. at page 6, PNA's are typically of concern due to the fact that some have proven to be carcinogens. PNA's are a subset of aromatics and unsaturated hydrocarbons which together can comprise ten to 65 percent of crude or refined petroleum products by weight.

[282] Recon Systems, "Used Oil Burned as a Fuel," supra note 257, at pages 4-6; see also, Mueller Associates, supra note 22, at page 23.

to the fact that the original virgin fuel and its combustion products contain high levels of PNA's and other potentially hazardous substances.[283] Therefore in order to fully assess the hazards of burning waste oil, it is necessary to consider the fact that virgin oil products contain, as a result of their chemical makeup and/or the refining process, many of the same substances which are of concern for waste oil usage; however, typically the levels of most hazardous constituents are much higher in used oils than in unused oil.[284]

The hydrocarbon composition in fuel oils varies, as with all crude and refined products, depending upon the source of crude oil and the specific refining process utilized. Generally, saturated hydrocarbons (hydrocarbons with no carbon-carbon bonds) comprise a larger fraction than aromatics and unsaturates of most middle distillates, including kerosene, diesel fuel, and No.'s 1 and 2 fuel oil; however, the aromatics and unsaturates together can comprise ten to 65 percent of these products by weight. This fact is important because a subset of this group is PNA's, some of which are proven carcinogens. This is particularly significant since as the weights of the fuel oils increase (primarily No.'s 3-6) so does the molecular weight of the hydrocarbons and the levels of aromatics and unsaturates, and thus the concentration of potential carcinogens.[285]

The same increasing concentrations also hold true for heavy

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[283] Mueller Associates, supra note 22, at page 37.

[284] Franklin Associates ,supra note 25, at section 5, pages 10 (table 49), 11 (table 50), and 12, tables 49 and 50 provide comparisons of heavy metal concentrations in used oils to those of virgin fuel oils.

[285] Id. at page 6.

metals and total chlorine. No. 2 distillate fuel contains virtually no detectable metals, except perhaps very low lead levels. In the heavier fuel, the concentrations of barium, lead and chromium typically range from two to five ppm. The highest reported lead concentration is ten ppm in a No. 4 fuel oil. Barium has been found at concentrations as high as 13 ppm in No. 4 fuel oil and as high as 14 ppm in residual fuels. All metals have been detected in fuel oils, but at relatively low levels compared to used oil concentrations; however, chromium, arsenic and cadmium have been detected in some heavy fuel oils at levels which sometimes approach the levels found in used oil.[286]

Generally, total chlorine is below five parts per million (ppm) in unused oils and the combined concentration of benzo(a)anthracene and benzo(a)pyrene[287] is typically less than one ppm. In the heavier fuels total chlorine is typically below ten ppm; however, concentrations between 30 and 85 ppm have been reported by the National Bureau of Standards. The combined concentrations of benzo(a)anthracene and benzo(a)pyrene are usually below three ppm for No. 3 and No. 4 fuel oil, but can be much higher for residual fuels and can exceed 100 ppm.[288]

Chlorinated solvents generally are not found in unused oils,

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[286] Id. at pages 11 and 12.

[287] National Bureau of Standards Special Publication 674, "The Fate of Hazardous Wastes in Used Oil Recycling," supra note 247, at page 25, states that the reason for special concern for the presence of benzo(a)pyrene and benz(a)anthracene is that they are compounds of proven mutagenicity.

[288] Franklin Associates, supra note 25, at section 5, page 11.

while typical levels of 200 to 2,000 ppm are common in used oils. Total chlorine concentrations of five to ten ppm are common in fuel oils compared to typical levels above 1,000 ppm in used oils. Chlorine is primarily a constituent of organic compounds, usually solvents, in used oils. It is in inorganic form, primarily salts, in unused oils. Benzo(a)pyrene and benzo(a)anthracene concentrations in heavy residual oils can be as high or higher than typical concentrations in used oils, while lower concentrations of these PNA's are generally measured in the distillate fuels.[289]

No studies have reported finding PCB's in any unused fuel oils, whereas one-third of the used oil samples tested contained measurable levels of this group of constituents.[290]

In general, waste oils are much cleaner fuels than No. 6 fuel oil and coal. This is because since waste oils contain smaller amounts of sulfur, silicon, sodium, vanadium and nickel than these other fuels, the emissions from the burning of waste oil will also contain less of these substances and thus be cleaner. The burning of waste oil also generates less particulate emissions than coal. It has also been determined that the substitution of waste oil for coal will result in sharply reduced emissions of the contaminants listed above as well as emissions of calcium, iron, magnesium, beryllium, manganese, silver, strontium, aluminum, titanium, boron and molybdenum. In addition, waste oil fuels are generally dramatically cleaner in concentrations of trace metal content (except for lead and

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[289] Id. at page 12.

[290] Id.

phosphorus) than pure coal.[291]

(b) Road Oiling/Dust Control with Used Oil

Due to the increasing concerns about the hazards of utilizing used oil as a dust suppressant and weed killer on roads, the EPA in 1982 commissioned a study to carry out a state-by-state survey to evaluate road oiling practices.[292] The quantity and quality of the available data for the states varied considerably. Some states had almost no records on the subject while others maintained used oil programs which attempted to monitor oil generation, recovery and reuse. The latter states often have a good idea of the amount of road oiling which occurs; however, the existence of a used oil recycling program by no means assures the availability of quantitative data on used oil usage. For the states with no programs but in which road oiling is known to occur, estimates were based upon conversations with state environmental agency personnel and local used oil collectors.

The survey estimated that about 40 to 60 million gallons of used oil were used as commercially applied road oils (within the U.O.M.S.) during 1982 in the United States, with an additional 20 to 40 million gallons being applied by generators (used oil not passing through the U.O.M.S.) including farmers, mining and construction

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[291] Mueller Associates, supra note 22, at pages 112 and 114.

[292] Bider, W.L., S.C. Metzle, and R.G. Hunt, "Evaluation of the Use of Waste Oil as a Dust Suppressant." Prepared for the U.S. EPA, Office of Solid Waste, September 1983.

companies and other miscellaneous industries. These estimates are reasonably in line with the 1983 Franklin Associates study which was developed on a facility basis and estimated that 69 million gallons of used oil (40 million gallons commercially applied within the U.O.M.S. and 29 million gallons applied by generators) were utilized in 1983 for road oiling.[293] The fact that the 1983 estimates are at the low end of the 1982 study estimates may be a reflection of the decreasing use of used oil for this purpose.[294]

Used oil is typically applied to the road surface at a rate of about .25 gallons per square yard. The most common road oiling material is the used oil as collected without any form of processing; in addition, a road oiler will often use the bottom layers of settled used oil for road oiling. This bottom layer material is likely to have a high bottom sediment and water content. It is a common practice for used oil processors to sell the top layers of settled oil as fuel and the bottom layers as road oil. The only real physical control for the road oil content is that the solid content must be controlled to some degree because of potential problems with clogging the orifices on the application apparatus.[295]

Most used oil road oiling occurs in rural areas and on privately

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[293] Franklin Associates, supra note 25, at section 5, page 2 (table 45).

[294] Id. at page 16.

[295] Id. at page 18. Also note that 40 C.F.R. section 266.23(b), provides the following prohibition, "The use of waste or used oil or other material, which is contaminated with dioxin or any other hazardous waste (other than a waste identified solely on the basis of ignitability), for dust suppression or road treatment is prohibited."

owned roads at or near the source of generation.[296] The majority of the road oiling is performed by oil collectors, although some small amounts are applied by local government agencies.[297] In 1982, the state with the largest amount of used oil road oiling was California, which accounted for about one-fifth of the national total; however, a 1983 California regulatory action may have changed its status as the number one road oiling state.[298] States in which large amounts, in excess of one million gallons per year, of road oiling is common include: California, Ohio, Arizona, Iowa, Wisconsin, Washington, Georgia, and Colorado.[299]

Although the commercial use of used oil on roads is only about six percent of all used oil collected, and is thus not a major disposal (or recycling) mechanism for used oil on a nationwide perspective, road oiling from a local or even regional perspective may be a major end-use market for used oil. The four main areas of road oiling are the northern Rocky Mountain states, the extreme southwest, the southeast, and a cluster of states along the Ohio River. Moderate levels of road oiling occur in the northwest and in northern New England.[300]

States have begun to recognize that there are risks inherent in

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[296] Temple, Barker and Sloane, supra note 72, at section III, page 8; see also, PEDCo Environmental, Inc., "Evaluation of Health and Environmental Problems Associated with the Use of Waste Oil as a Dust Suppressant," Final Draft Report, February 1984.

[297] Temple, Barker and Sloane, supra note 72, at section III, page 8.

[298] *Franklin Associates*, *supra note* 25, at section 5, page 16.

[299] Id. and page 17 (figure 10).

[300] Id. at pages 16 and 17 (figure 10).

using used oil for road oiling and several have taken regulatory actions to limit or prohibit its use. As of February 1984, the states prohibiting the use of used oil as a dust suppressant were: Delaware, Kansas, Massachusetts, Minnesota, Missouri, New Jersey, New York and Rhode Island.[301] Even though road oiling is legally prohibited in these states, enforcement is difficult in the remote areas where road oiling most often occurs, and private generator oiling is known to still be a practice in several areas.[302] States regulating but not prohibiting the use of used oil as a dust suppressant include: Alaska, California, Illinois, Indiana, Maine, Michigan, Montana, North Carolina, North Dakota, Oklahoma, Pennsylvania, Utah and Vermont.[303] It must also be noted that the use of used oil contaminated with hazardous waste (other than a waste identified solely on the basis of ignitability) as a dust suppressant or road treatment is also prohibited under 40 C.F.R. section 266.23.

The environmental impacts of road oiling with used oil depend on many factors the most important of which is the presence of hazardous constituents in the oil. The Franklin Associates study measured the concentration of hazardous constituents in about 230 road oil samples.[304] Although the study showed that road oils

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[301] Temple, Barker and Sloane, supra note 72, at table III-4; see also, Franklin Associates, Ltd., "Evaluation of Health and Environmental Problems Associated with the Use of Waste Oil as a Dust Suppressant," February 1984.

[302] Temple, Barker and Sloane, supra note 72, at section III, page 8.

[303] Id. at table III-4.

[304] Franklin Associates, supra note 25, at section 5, pages 18 and 19 (table 52).

contain high levels of many hazardous constituents, the overall concentrations of hazardous metals in road oils was lower than those measured in oils which are burned.[305] On the other hand, the concentration of chlorinated solvents was higher for the road oil samples. This result is probably due to the fact that it is common to use bottom layers from storage tanks for road oiling, and if a tank is drained from the bottom for road oiling, a fairly high water content could be present. Since this water layer usually contains relatively low levels of metals and equal or greater concentrations of the more water-soluble solvents compared to straight oil layers, road oils may exhibit these characteristics with respect to used oils burned as fuel.[306] It must also be noted that since virtually any used oil can be used as a road oil, the probability of a wide variety of contaminants is high.

When used oil is applied to land (either as a road oil, dust suppressant, or when indiscriminately dumped), the oil and its contaminants can migrate by flotation (precipitation-induced

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[305] Id. at page 19 (table 52) indicates that the following potentially hazardous constituents at the mean concentrations in ppm were found in the waste oil used as road oil samples (the numbers in parenthesis are from section 5, page 5 (table 46) and indicate the level of the constituents found in used oil burned as fuel): arsenic-21/(20); barium-87/(137); cadmium-1/(4); chromium-34/(38); lead-403/(555); zinc-492/(707); dichlorodifluoromethyane-136/(373); trichlorotrifluoroethane-330,000/(954); 1,1,1-trichloroethane-4,280/(1,598); trichloroethylene-1,740/(850); tetrachloroethylene-2,242/(1,210); total chlorine-5,500/(5,540); benzene-124/(1,716); toluene-685/(3,353); xylenes-26,579/(3,520); benzo(a)anthracene-510/(24); benzo(a)pyrene-268/(10); naphthalene-not measured/(588); PCB's 23/(167).

[306] Id. at section 5, page 18.

runoff), by percolation through the soil, by direct runoff (when the application of oil is excessive), by volatilization, and by dust transport.[307] The quantities of used oil with the associated contaminants transported by these various mechanisms vary greatly and depend upon the type and quality of the used oil, terrain, soil porosity, wind and rain conditions, temperature, traffic volume, and rate of application. Overall, the potential for environmental degradation from road oiling is significant for some areas.[308]

Data regarding the fate of disposition of waste oil contaminants following its application to road surfaces is very limited. One study performed for the EPA[309] reports that only about one percent of the oil applied to dirt roads over long periods (12 or more years) is retained on the road surface. Approximately 17 to 18 percent of the oil is lost through evaporation, while another ten to 20 percent is lost through rainfall runoff, with the most runoff occurring during the first rains following application.[310] Although no data is available for support, it has been suggested that other factors such as biodegradation and re-entrainment of oil-coated particles by road traffic could account for a large fraction of the long-term oil transport from the road surface.[311] Direct

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[307] Teknetron, Inc., supra note 171, at page 155.

[308] U.S. EPA, Report to Congress, "Listing Waste Oil as a Hazardous Waste," supra note 10, at page 72.

[309] Freestone, F.J., "Runoff of Oils from Rural Roads Treated to Suppress Dust," for U.S. EPA, 1972.

[310] National Bureau of Standards Special Publication 674, "The Fate of Hazardous Wastes in Used Oil Recycling," supra note 247, at page 18.

penetration of oil beneath the first few millimeters of road surface does not appear to be a major factor.[312]

A study performed by the GCA Corporation,[313] which extended the scope of the EPA study, indicates that in addition to oil lost by evaporation (initially 12 percent) another three to five percent is lost by runoff. This measured runoff is three to four times less than the ten to 20 percent found in the EPA study and was probably the result of differences in soil density and configuration.[314] Almost all of the oil left in the soil was retained within a few millimeters of the surface.[315] Below a depth of one centimeter the organic content of the soil was indistinguishable from the background level of the untreated soil.[316]

More serious problems can be caused from the runoff which results when rain falls on the oiled road. The elemental analyses of runoff indicate that the transfer of some elements from the road oil

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[311] Id.; see also, Mueller Associates, supra note 22, at page 131.

[312] Id.

[313] National Bureau of Standards Special Publication 674, "The Fate of Hazardous Wastes in Used Oil Recycling," supra note 247, at page 18-20, which draws upon the study performed in the GCA Corporation, "The Fate of Hazardous and Nonhazardous Waste in Used Oil Disposal and Recycling," Report No. DOE/BC/10375-6, for U.S. DOE, October 1983.

[314] National Bureau of Standards Special Publication 674, "The Fate of Hazardous Wastes in Used Oil Recycling," supra note 247, at page 20; and Mueller Associates, supra note 22, at page 131.

[315] National Bureau of Standards Special Publication 674, "The Fate of Hazardous Wastes in Used Oil Recycling," supra note 247, at page 20.

[316] Id.

to the runoff is small, but possibly significant.[317]

Organic analyses of the road oil and rainfall runoff indicates that the major constituent of rainfall runoff is phenols. Even though most of the organics present in road oil are present in the runoff, they generally are present just above detection levels and at concentrations below ten micrograms per liter. Given the ppm concentration levels of compounds such as benzo(a)pyrene and PCB's in the used oil applied to the soil, it is improbable that they will be present at the parts per billion (ppb) level in the runoff.[318]

The results of a recent study[319] indicate that the level of contaminants will depend upon the amount of rain that leaves as runoff from the road surface, and that the concentration of contaminants rises with the amount of runoff. This is primarily attributed to contaminant solubility under acidic conditions such that, at low levels of runoff (e.g., .5 percent), a contaminant's presence is associated primarily with its solubility in water, while at higher concentrations (e.g., 5 percent and above) both soluble and adsorbed contaminants are normally present in the runoff.

Perhaps the major problem with road oil runoff is that in certain areas, near bodies of water or wetlands, oils from the runoff

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[317] Mueller Associates, supra note 22, at page 132 reporting the results of elemental transfer from oiled-roadbed to rainfall runoff performed by the GCA Corporation, "The Fate of Hazardous and Nonhazardous Waste in Used Oil Disposal and Recycling," Report No. DOE/BC/10375-6, for U.S. DOE, October 1983.

[318] Id.

[319] Metzler, Suzanne C. and C. Jarvis, "Effects of Waste Oil Contamination," Environmental Progress, Volume 4, No. 1, pages 61-68, February 1985.

will coat the water's surface with a thin film. This occurs because oils are generally stable in and are lighter than water. As little as 35 ppm of oil can be seen floating on water as a thin flim, and one pint of oil can produce a slick of approximately one acre in size. These surface oil films coat and destroy plankton, algae and aquatic insects. They also affect photosynthesis and re-eration of the water. Oil present in the water in which birds bathe and gather food can destroy water-impermeable compounds on the birds' feathers. The destruction of these compounds leaves the feathers wet and oily and renders the birds unable to fly, thus trapping them in the slick to eventually die. Oil has also been found to inhibit egg-laying and hatching. In addition, low concentrations of oil coat the gill filaments of fish which causes suffocation.[320]

Generally the environmental impacts of treating roads with used oil are dependent upon many factors including the composition of the oil and the surrounding environmental conditions. Results of the available studies tend to indicate that the overall environmental impact of road oiling is not severe, although a few severe cases have been reported from highly contaminated oil.[321] Most of the

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[320]Mueller Associates, supra note 22, at pages 132 and 136; see also, Yates, John J., et al., "Used Oil Recycling in Illinois: Data Book," Report No 78/34, for the State of Illinois, Institute of Natural Resources, Chicago, Illinois, October 1978; and, supra notes 141-143, and accompanying text.

[321]Mueller Associates, supra note 22, at page 135. The following examples were provided in EPA's 1981 Report to Congress, "Listing Waste Oil as a Hazardous Waste," supra note 10, at page 74. First Example: In Missouri in 1971, about 5000 gallons of waste oil containing 300 ppm dioxin were sprayed on the floor of a horse

contaminants are lost to runoff and windborne dust particles, which can produce limited episodes of environmental degradation. Biodegradation and adhesion to vehicles are responsible for some of the oil leaving the road surface, while penetration downward through the soil is minimal.[322]

(c) Re-Refining Used Oil

The third significant end-use of used oil is re-refining, which is a type of processing rather than an end-use in the same sense as burning and road oiling. The process is an intermediate step associated with the ultimate reuse of used oil as a lube base stock. In 1983, approximately 63 million gallons of used oil entering the U.O.M.S. was re-refined for use as lubricating oil and an additional 44 million gallons were reused on site.[323] Reuse of lubricants by

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arena. Sixty-three horses died; many other horses, dogs, cats and birds became ill after exposure to the arena. One child who played in the area developed epistaxis, gastrointestinal disorders, and severe hemorrhagic cystitis. Ten other persons were afflicted with diarrhea, headaches, nausea, and persistent skin lesions. Second Example: In 1978, 33,000 gallons of transformer oil contaminated with PCB's were dumped along 210 miles of secondary roads in North Carolina. The North Carolina Agriculture Commissioner cautioned against any direct or indirect human consumption of crops grown within 100 yards of the spill. Nearby residents reported nausea, dizziness and cramps. Third Example: In Texas in 1978, used oil serving as a "mask" for toxic wastes was applied to roads as a dust suppressant. Nearby residents suffered headaches and nausea and livestock died. The used oil was found to contain nitrobenzene and cyanide.

[322]Mueller Associates, supra note 22, at page 136.

[323]Franklin Associates, supra note 25, at section 5, page 2 (table

industry on-site may consist of sophisticated re-refining technologies or simpler processor technologies.

There is very limited data available concerning the presence of hazardous constituents in re-refined base lube stock; however, the available data indicates, and the general belief is, that re-refined base lube stock is free of the constituents of concern found in most used oil. Undocumented reports from re-refiners do exist which indicate that some re-refined lubes have contained PCB's and PNA's such as benzo(a)pyrene. The re-refining industry has also indicated that re-refined lube oils from acid-clay processes sometimes fail to thoroughly remove the metals associated with additive packages, primarily zinc and barium. Since these particular contaminants and circumstances have not been assessed, there is no data to either confirm or discount these reports.[324]

The general belief of the industry is that since re-refiner's product oil (the base stock) is subject to stringent quality standards, re-refiners are more concerned than fuel processors about the quality of incoming feedstock, particularly for the presence of PCB's and PNA's which may not be removed during re-refining. Studies of the used oil delivered to re-refiners indicates that there is actually very little difference in the quality of used oil delivered to re-refiners and that of the used oil delivered to be burned as fuel.[325] This is probably due to the fact that both end-

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45); see Appendix A, table 5.

[324] Id. at section 5, page 20.

[325] Id. at pages 21, 15 (tables 51) and 22 (table 53).

users compete for the same oil.

The major health and environmental concerns for the re-refining end-use are not the resulting products but the by-products of the processes. These by-product concerns include air emissions, liquid effluents and solid wastes generated from the various unit operations in a re-refinery.[326]

Air emissions are of little concern as they are relatively easy to control, since a properly operating re-refinery will emit few air emissions. The principal sources of re-refinery air emissions are vents from process and wastewater treatment units and storage tanks, which commonly produce odors around most re-refining facilities. Little is known about the actual composition of these air emissions; however, the most likely sources of these odors are esters and organic compounds containing oxygen and nitrogen. In addition, very low concentrations of organic sulfur compounds and small amounts of SO_2 and SO_3 may be present. These and other re-refinery emissions can be easily mitigated by sending them to a furnace where the combustible materials are burned, and in some plants, caustic or ammonia scrubbers may also be used to reduce the pollution impact of air emissions. No air emission control equipment beyond these has been found to be necessary to date.[327]

Liquid effluents from a re-refining plant can emanate from the following sources: (1) water separated from raw drain oil; (2) cooling water from heat exchangers; (3) contaminated cooling water;

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[326] Mueller Associates, supra note 22, at page 114.

[327] Id. at pages 114 and 115.

(4) plant runoff water; (5) water from vent gas scrubbers; and (6) small amounts of wastewater from the condensed steam that contacts oil. Together these sources can generate between 100,000 and two million gallons per year of wastewater per re-refining plant, depending upon the re-refining technologies, used oil quality and wastewater control management practices.[328]

Generally these liquid effluents contain trace metals (as dissolved or suspended solids), chlorinated solvents, phenols and other organics, as well as suspended or emulsified oil. Since metals generally remain in the oil rather than settle with the wastewater, there is normally a low metals concentration in the wastewater due to the small amount of oil that remains in the separated water fraction. Chlorinated and aromatic solvents are found in the wastewater in fairly high concentrations, roughly equivalent to those found in the used oil. One-forth of the wastewater samples tested in the GCA Corporation study contained PCB's.[329]

Most re-refining processes generate two types of solid waste streams. The first is sludge (such as dehydration sludge, acid sludge, and solvent sludge) and the second is spent clay.[330] There

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[328] Id. at pages 116 and 117.

[329] Franklin Associates, supra note 25, at section 4, page 36; see also, Chicoine, L.C., et al., "Reuse of Waste Oil at Army Installations," Technical Report No. N-135, U.S. Army Corps of Engineers, Champaign, Illinois, September 1982; and GCA Corporation, "The Fate of Hazardous and Nonhazardous Waste in Used Oil disposal and Recycling," supra note 313.

[330] Mueller Associates, supra note 22, at pages 120, 121 (figures 22) and 122 (figure 23).

are two major re-refining technologies: (1) acid-clay; and (2) vacuum distillation. The acid-clay process generates in-line filtered residue, acid sludge and spent clay. The vacuum distillation process generates in-line filtered residue and spent clay.[331]

Settled sludge is generated during used oil storage or as part of the process for removing water and solids from waste oil. The available studies indicate that the composition of settled sludge is roughly equivalent to that of used oil, primarily because this sludge contains more than 50 percent oil.[332]

Distillation bottoms are residues, containing higher boiling and other nonvolatile materials, generated by the distillation processes.[333] They are commonly used as asphalt extenders, and if discarded, they are usually disposed of in lagoons. Distillation bottoms generally contain significantly larger quantities of ash, sulfur, nitrogen and oxygen than the feed oil. The ash content may range between ten and 25 percent, and the lead content can approach 1.5 percent, depending upon the composition of the used oil and the extent of pretreatment prior to distillation.[334] The concentration of some of the other toxic metals are also fairly high, with the Franklin Associates study reporting the following mean contaminant levels in distillation bottoms from re-refining facilities: arsenic 8.1 ppm; barium 447 ppm; cadmium 12 ppm; chromium 43.2 ppm; lead

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[331] Id. at page 124 (table 63).

[332] Id. at page 124 and 125 (table 64); see also, Recon Systems, Incorporated, "Waste Oil Recycling and Disposal," Report No. PB-236148, for U.S. EPA, August 1974.

[333] Mueller Associates, supra note 22, at page 125.

[334] Id. at page 126.

6,543 ppm; and zinc 1,360.8 ppm.[335]

Acid sludge is produced primarily by the acid-clay re-refining process in which waste oil is contracted with sulfuric acid, after which the acid sludge generated is settled out and removed, leaving relatively clean oil. The acid sludge contains sulfuric acid, aromatic and asphaltic compounds, metals, polymers and organic acids which come from the used oil.[336] The high acid content requires that the sludge be handled as carefully as the original acid. Since as much as 30 to 50 percent of the acid sludge is water soluble, land disposal is very difficult, and the lead content which can range from two to ten percent further complicates proper disposal. Since acid recovery is very expensive on a small scale and transportation costs are too high to justify centralized recovery plants, the acid sludge has no economic value, and most of it is disposed of, usually without neutralization, in landfills or lagoons. Sludge disposal into wastewater can only be practiced where high volume wastewater treatment facilities are available for dilution.[337]

Solvent sludge is produced primarily by solvent extraction processes such as the BETC and propane extraction processes. Unlike the acid sludge, solvent sludge contains a more concentrated stream of metal by-products, higher ash, lower solvent insolubles,

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[335] Franklin Associates, supra note 25, at section 4, page 39 (table 44).

[336] See Mueller Associates, supra note 22, at page 128 (table 66) for a detailed analysis of acid sludge.

[337] Mueller Associates, supra note 22, at page 126; see also, Freestone, F.J., "Runoff of Oils from Rural Roads Treated to Suppress Dust," prepared for the U.S. EPA, 1972.

lower sulfur, higher non-volatile residue, higher heat content and only a small fraction of the acidity contained in acid sludge streams.[338]

Spent clay is generated primarily during clay polishing of the used oil, a treatment step commonly employed to remove the final contaminants in the used oil and to improve the color and odor of the final product. These processes produce approximately .4 pounds of spent clay per gallon of oil treated. The process of using clay as a filtration media also produces small amounts of spent clay.[339] Spent clay is typically disposed of in landfills, though, application as a surfacing material has recently been identified as a use.[340]

Metals content is lowest in spent clays used to polish lube oils from distillation/clay re-refining processes, while significantly higher levels are reported for clay used in contact filtration processing and chemical treatment/clay bead re-refining. The acid/clay re-refining facilities produce clays with intermediate levels of metals.[341]

Most spent clays have insignificant levels of chlorinated and aromatic solvents since these contaminants are separated from the used oil prior to contacting the clay.[342] Higher molecular weight

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[338] Mueller Associates, supra note 22, at page 126.

[339] Id. at page 129.

[340] Id.

[341] Franklin Associates, supra note 25, at section 4, pages 36 and 37 (table 43).

[342] Chemical Engineering, Volume 86, pages 104-106, April 23, 1079.

hydrocarbons such as PCB's and PNA's have not been measured; however, their presence in spent clay would most probably be at levels directly related to their concentration in the used oil, thus, significant contamination by these constituents is possible.[343]

(d) Miscellaneous End-Uses of Used Oil

In addition to the three major end-use markets for used oil (burning, road oiling, and re-refining) several minor end-use practices exist. These miscellaneous practices are often referred to as "non-fuel industrial uses" and account for the end-use of approximately 35 millions gallons of used oil entering the U.O.M.S. per year.[344] A fairly significant market in some southern states, particularly Florida, involves the use of used oil in the phosphate industry as a flotation oil in their processes. Used oil is also utilized by asphalt plants by blending it into their product as an extender as well as using it as a fuel. A third important, although relatively minor commercial end-use market, is the concrete construction industry which uses used oil as form oil. This practice is little used due to the inconvenience of obtaining the small quantities of used oil needed on a construction site and the availability of other oils, such as diesel, which are already on-site. Generators also report using used oils as machinery lubricants, pesticide carriers, weed killers, cattle oilers; and even as an all-

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[343] Franklin Associates, supra note 25, at section 4, page 36.

[344] Id. at section 5, page 2 (table 45); see, Appendix A, table 5.

purpose cleaner.[345]

Even though there is no data available on the hazardous constituents in used oil consumed for these minor end-use applications, it should be assumed that any used oil could potentially be used for these purposes, and as discussed in Chapter III, some of these oils contain contaminants which can be especially dangerous.

(e) Used Oil Disposal and Dumping

After burning, the largest end-use of used oil is disposal or dumping. The Franklin Associates study found that of the used oil entering the U.O.M.S., 42 million gallons a year were disposed of by incineration with no reported dumping. Of the used oil not entering the U.O.M.S., 122.6 million gallons per year were disposed of by incineration and 241.2 million gallons per year by dumping.[346] If disposed of properly, risks from used oil disposal are minimal. The dangers exist, however, because much of the quantity of used oil currently disposed of finds its way to municipal sanitary landfills that do not limit the migration of the potentially hazardous constituents. In addition, a large quantity of used oil is simply dumped, often into municipal sewers. These dumpers are primarily (an estimated one-half)[347] do-it-yourselfer oil changers, along with

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[345] Id. at page 21.

[346] Id. at page 2 (table 45); see, Appendix A, table 5.

[347] Mueller Associates, supra note 22, at page 180.

a significant contribution from operators of large off-road equipment including farmers, construction crews, mining companies and the military.[348]

In general, only low quality oils are disposed of by generators and collectors primarily because virtually all used oils have value; however, in some cases disposal of good quality oil takes place because the quantity is not large enough to warrant storage and sale to a collector. Processors and re-refiners will generally accept oils with bottom sediment and water (BS&W) contents up to 50 percent, however, the price paid is usually low or nonexistent for poor quality oil. Disposal is a costly alternative which is often subject to various state and federal regulations; thus, oils which are accumulated by generators, other than DIYer's, seldom flow directly to disposal. In 1983 it was estimated that only six percent, approximately 64.7 million gallons, of the used oil flowed directly to disposal.[349]

Large quantities, an estimated 241 million gallons in 1983, of the used oil are simply dumped. Most of this oil is automotive engine oils, and over 100 million gallons of DIYer automotive oil are believed to be dumped each year in backyards, drains, along roadsides and in other places.[350]

Used oil dumped into sanitary sewers which feed into sewage treatment plants is of concern since the operation of the treatment

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[348] Temple, Barker, and Sloane, supra note 72, at section IV, page 48; a. Franklin Associates, supra note 25, at section 5, page 24.

[349] Franklin Associates, supra note 25, at section 5, page 23.

[350] Id. at page 24.

plant can be affected by the presence of trace metals such as metal salts. However, a more serious problem concerns the fate of used oil placed into sewer systems which are not serviced by a treatment facility. Based on a national survey conducted in the early 1980's it was determined that a significant portion, perhaps as much as 60 million gallons a year, of the used oil generated by individuals who change their own automotive oil ends up in municipal sewer systems.[351] Because of the high cost of proper collection and removal, oils from other sources also find their way to the sewer system; however, discarded automotive oil does account for a major fraction of some sewer systems' hydrocarbon loading. In addition, urban runoff (which may or may not find its way into the municipal sewage treatment facility) has been found to contain petroleum whose composition resembles used crankcase oil in composition.[352]

With respect to contaminant levels in aqueous sewer systems, the water soluble fraction of oil-water mixtures has been reported to contain a number of organic and inorganic compounds. Laboratory simulation of sewer disposal conditions indicate that approximately

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[351] National Bureau of Standards Special Publication 674, "The Fate of Hazardous Wastes in Used Oil Recycling," supra note 247, at page 18. The Franklin Associates study, supra note 25, at section 5, page 23, estimated that over 40 million gallons of used automotive oil is disposed of annually in municipal solid waste; therefore, of the estimated 100 million gallons of used automotive oil which is estimated to be dumped annually a significant portion of the remaining 60 million gallons may end up in sewer systems.

[352] National Bureau of Standards Special Publication 674, "The Fate of Hazardous Wastes in Used Oil Recycling," supra note 247, at page 18.

85-90 percent of these used oil constituents contained in the oil-water mixtures were associated with the particulate matter in the water.[353] This is particularly important since efficient control technologies for the particulate matter (and free oil) can be implemented at treatment facilities; thus, discharge into sewers served by secondary treatment plants would result in little or no adverse impact.[354] In addition, the types of pollutants identified with the oils typically dumped into sewer systems are reportedly effectively treated by publicly-owned treatment works (POTW).[355]

Unfortunately, recent data indicate that only about 25 percent of the urban population is served by combined sewer systems using effective primary and secondary treatment plants. The remaining 75 percent of the urban population is served by storm sewer systems or they live in unsewered areas. In general, storm water discharged from storm sewer systems will not receive any treatment.[356] This is of significant concern because, since the concentration of some of the contaminants typically found in used oil[357] exceed the EPA suggested concentration goals for stream discharge (most notable is the 5.0 micro grams per liter for phenols), sewer disposal of used

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[353] Id. and Mueller Associates, supra note 22, at page 139.

[354] Id.

[355] National Bureau of Standards Special Publication 674, "The Fate of Hazardous Wastes in Used Oil Recycling," supra note 247, at page 18.

[356] Id., and Mueller Associates, supra note 22, at page 141.

[357] See Chapter III and Appendix A, table 1 of this thesis for a listing and discussion of the potentially hazardous constituents typically found in used oil.

oil represents a practice which is potentially harmful to the large percentage of the urban population living in areas where storm water control is not practiced and to other populations which are downstream of storm water discharge points.[358]

In 1983 it was estimated that over 40 million gallons of relatively good quality DIYer oil was disposed of with municipal solid waste.[359] Since a large portion of municipal solid waste is disposed of in landfills, this practice also presents significant health and environmental concerns. The major problem of dumping used oil into landfills is contamination of ground water supplies. This contamination usually occurs when refuse leachate from the landfill penetrates groundwater sources in deep sandstone or shallow aquifers. Runoff from the landfill can also contaminate surface waters. The potential for harm is great since as the used oil migrates to the groundwater or surface water, it carries with it most of its hazardous contaminants.[360] These concerns can be avoided by disposing of the used oil in RCRA permitted facilities.[361]

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[358] National Bureau of Standards Special Publication 674, "The Fate of Hazardous Wastes in Used Oil Recycling," supra note 247, at page 18; and Mueller Associates, supra note 22, at page 141.

[359] Franklin Associates supra note 25, at section 5, page 23. This data was obtained through telephone interviews and site visits carried out by Franklin Associates, Ltd. and PEDCo Environmental, Inc. during the first half of 1983.

[360] U.S. EPA, Report to Congress, "Listing Waste Oil as a Hazardous Waste," supra note 10, at page 72; and Mueller Associates, supra note 22, at page 141.

[361] Mueller Associates, supra note 22, at page 141.

V. REGULATORY BACKGROUND

(a) Introduction

In 1976 Congress enacted the Resource Conservation and Recovery Act of 1976.[362] Subtitle C of RCRA, 42 U.S.C. sections 6921-6939a, establishes a comprehensive "cradle-to-grave" regulatory scheme for the safe treatment, storage and disposal of hazardous waste. Section 3001 of RCRA, 42 U.S.C. section 6921, directs EPA to identify and list those solid wastes which are hazardous wastes and therefore subject to regulation under Subtitle C. Under section 3001of RCRA particular solid wastes become hazardous wastes if they have one or more of the characteristics of hazardous wastes identified by EPA (referred to as "characteristic wastes") or if EPA has listed them as hazardous wastes (referred to as "listed wastes"). EPA identified the four characteristics of hazardous waste to be: (1) ignitability; (2) corrosivity; (3) reactivity; and (4) Extraction Procedure toxicity.[363] Any waste exhibiting one or more of these properties, measured by the test protocol specified in the regulation, is a "characteristic" hazardous waste. Classes or types of wastes specifically listed as hazardous

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[362] RCRA was created in 1976 by P.L. No. 94-580, 90 Stat. 2795, and amended in 1980 and 1984: Used Oil Recycling Act of 1980, P.L. No. 96-463, 94 Stat. 2055; Hazardous and Solid Waste Amendments of 1984, P.L. No. 98-616, 98 Stat. 3221 (codified as amended at 42 U.S.C. sections 6901-6991i (1982 and Supp. III 1985)).

[363] 40 C.F.R. sections 261.21-261.24 (1987).

by the EPA in rule making proceedings[364] are the "listed" wastes.[365] Both categories of hazardous wastes are subject to the standards of proper transportation, storage, treatment and disposal under Subtitle C of RCRA.[366]

The initial EPA proposal of guidelines and regulations for the management of hazardous wastes and of specific rules for the identification and listing of hazardous wastes under section 3001 of RCRA was made on December 18, 1978.[367] This initial EPA effort to regulate hazardous waste proposed classifying waste lubricating oil and waste hydraulic and cutting oils as hazardous waste on the basis of their toxicity.[368] It also proposed to regulate used hazardous lubricating, hydraulic, transformer, transmission and cutting oils that were incinerated or disposed under section 3001 of RCRA. In addition, any used oil that exhibited the characteristics of hazardous waste would be considered hazardous and subject to Subtitle C of RCRA. The proposed rules included management

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[364] See criteria contained in RCRA section 3001(a) and 40 C.F.R. section 261.11(a)(1)-(3).

[365] "Listed" hazardous wastes are set forth at 40 C.F.R. sections 261.31-261.33.

[366] See 40 C.F.R. sections 262-268.

[367] See 43 FR 58946 (December 18, 1976). The proposed regulations included: (1) Criteria for identifying and listing hazardous wastes, and a hazardous waste list; (2) standards applicable to generators and transporters of hazardous waste to ensure proper record keeping, reporting, labeling, containerization and use of transport manifest for these wastes; and (3) performance, operating and design standards applicable to persons who treat, store, or dispose of hazardous waste.

[368] 43 FR 58946 (May 19, 1978) at 58957.

standards applicable to generators and transporters of hazardous waste as well as performance, operating, and design standards for treating, storing and disposing of all used oils.[369]

Even though this EPA proposal had as it prime purpose the protection of human health and the environment from the improper management of hazardous waste (in this case used oil),[370] a large percentage of commenters on this proposal argued that the Agency should not list waste oil as hazardous because most waste oil was reused and was, therefore, not a waste; and, in addition, such a designation would have serious impacts on the recycling industry.[371]

As a consequence of these comments, EPA in its May 19, 1980 final hazardous waste rules [372] (which implemented many of the rules proposed in 1978) decided to defer promulgation of rules covering the use or recovery of many waste streams, including waste oil, in order to fully consider whether waste- and use-specific standards should be implemented rather than imposing the full set of Subtitle C regulations on potentially recoverable and valuable materials.[373] EPA stated in the preamble to the final

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[369] Id.; see also, 50 FR 49212 (November 29, 1985) at 49214, and 50 FR 49258 (November 29, 1985) at 49259 for additional discussions of this initial regulatory effort.

[370] 43 FR 58946 (December 18, 1976).

[371] See 50 FR 49258 (November 29, 1985) at 49259.

[372] See 45 FR 33066 (May 19, 1980) at 33094-33095.

[373] 45 FR 33066 (May 19, 1980) at 33084; also note, that at 33092, EPA flatly rejected claims by some commenters that appropriate regulation of wastes such as used oil would "stigmatize" them, and thus discourage recycling by stating, "EPA does not agree with the largely unsubstantiated claims of commenters that controlling the

regulations that it intended to address the reuse and recovery of waste oil by the Fall of 1980; therefore, since the Agency anticipated controlling the recycling of used oil within a short time, it also decided not to list waste oil for disposal in the 1980 regulations in order to deal with the entire waste oil issue at one time.

The net effect of the May 19, 1980 rules was that used oil would be subject to these hazardous waste regulations only if it exhibited one or more characteristics of hazardous waste and if it were not recycled or reused. Because relatively little used oil meets both of these conditions, most used oil was not brought under the control of this federal hazardous waste program.[374]

(b) The Used Oil Recycling Act of 1980

On October 15, 1980, Congress enacted the Used Oil Recycling Act of 1980.[375] This action was in recognition of the fact that the country was in the midst of an energy crisis for which used oil offered some relief as an important source of energy, and the

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use and recycling of hazardous waste will necessarily discourage bona fide, environmentally sound re-use and reclamation activities ...In many cases, Federal or State regulation of these activities should legitimize, not stigmatize, them in the eyes of the public and increase the flow of wastes to well-operated facilities. Indeed, EPA received comments from several waste recyclers urging the Agency to extend Subtitle C control to their operations for these very reasons."

[374] 50 FR 49212 (November 29, 1985) at 49214.

[375] P.L. No. 96-463, 94 Stat. 2055.

continued concerns for the hazards posed by the mismanagement of used oil.[376] The Congressional findings clearly state the dual purposes of the UORA:

> The Congress finds and declares that--
> (1) used oil is a valuable source of increasingly scarce energy and materials;
> (2) technology exists to re-refine, reprocess, reclaim, and otherwise recycle used oil;
> (3) used oil constitutes a threat to public health and the environment when re-used or disposed of improperly; and
> that, therefore, it is in the national interest to recycle used oil in a manner which does not constitute a threat to public health and the environment and which conserves energy and materials.[377]

The UORA contained several provisions dealing with the regulation of used oil and recycled oil, a number of which were incorporated into RCRA, including Section 3 of the UORA which amended RCRA to provide: (1) definitions of "used oil," "recycled oil," "lubricating oil," and "re-refined oil;"[378] (2) labeling requirements for lubricating oil to encourage recycling;[379] (3) and assistance to the states. The most significant aspects of the UORA are found in

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[376] Senate Report, S. Rep. No. 879, 96th Cong., 2d Sess. 1 (1980) states these twin purposes of the UORA: "The purpose of S. 2412 is to encourage the safe reuse of used oil in the United States and to discourage improper burning or disposal of such oil." (S.2412, 96 Cong., 2d Sess. (1980), is the bill that later was enacted after being amended by the House.)

[377] 42 U.S.C. section 6901(a).

[378] See, supra note 21, and accompanying text.

[379] 42 U.S.C. 6914 (a).

sections 7 and 8, in which Congress placed various requirements on EPA.

Section 7 of the UORA amended RCRA by adding a new section 3012[380] which addressed recycled oil and required that:

> Not later than 1 year after the date of enactment of this section [by October 15, 1981], the Administrator shall promulgate regulations establishing such performance standards and other requirements as may be necessary to protect the public health and the environment from hazards associated with recycled oil. In developing such regulations, the Administrator shall conduct an analysis of the economic impact of the regulations on the oil recycling industry. The Administrator shall ensure that such regulations do not discourage the recovery or recycling of used oil.[381]

This provision is of particular significance since it provides the singularly unique authority for EPA to regulate a substance (recycled oil) under RCRA Subtitle C without it first being a hazardous waste.[382] The EPA conducted the economic impact analysis called for by section 7 of the UORA. However, even though considerable efforts toward promulgation of regulations for used oil recycling have been made, to date only controls for the burning of contaminated used oil as a fuel in boilers and furnaces[383] have been

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[380] Section 7 of the UORA was originally codified as section 3012 of RCRA; however, the in 1984 the Hazardous and Solid Waste Amendments to RCRA renumbered section 3012 as section 3014(a) of RCRA, 98 Stat. 3277.

[381] 42 U.S.C. section 6935(a).

[382] See discussion at 50 FR 1691 (January 11, 1985).

[383] 50 FR 49164-49211 (November 29, 1985), "Hazardous Waste Management System; Burning of Waste Fuel and Used Oil Fuel in

completed.

Section 8[384] of the UORA placed the following requirements on the Administrator:

> Not Later than ninety days after the date of the enactment of this Act [January 15, 1981], the Administrator of the Environmental Protection Agency shall--
>
> (1) make a determination as to the applicability to used oil of the criteria and regulations promulgated under subsections (a) and (b) of section 3001 of the Solid Waste Disposal Act [RCRA] relating to characteristics of hazardous wastes, and
>
> (2) report to the Congress the determination together with a detailed statement of the data and other information upon which the determination is based.
>
> In making a determination under paragraph (1), the Administrator shall ensure that the recovery and reuse of used oil are not discouraged.[385]

The EPA took no action pursuant to section 8(1) of the UORA; however, on January 16, 1981, the Agency submitted to Congress the report required by section 8(2) which was entitled "Listing Waste Oil as a Hazardous Waste."[386] In this report the EPA went beyond simply determining the applicability of the criteria and regulations relating to the characteristics of hazardous wastes and actually provided its rationale for intending to list certain used oil as

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Boilers and Industrial Furnaces," (Action: Final rule.).

[384] 94 Stat. 2058 (uncodified).

[385] Id.

[386] U.S. EPA, Report to Congress, "Listing Waste Oil as a Hazardous Waste," supra note 10.

hazardous waste. The report states:

> When used oil is improperly managed, its oil component poses the same potential threat to ground and surface waters as does that of unused oil. ...the Agency believes that the following points lend further support for deeming some used oils to be hazardous wastes:
>
> 1. Most used automotive oils, and certain industrial oils, have been shown to contain significant concentrations of some or all of the following contaminants:
>
> a. polynuclear aromatic hydrocarbons such as benzo(a)pyrene, phenanthrene, and 1,2-benzanthracene, which are potent carcinogens;
> b. polychlorinated biphenyls (PCB's), which are carcinogenic, and other halogenated hydrocarbons, which are persistent toxics;
> c. nitrosamines, or their precursors, which are potent carcinogens;
> d. trace metals, such as lead, barium, chromium, and cadmium, which are toxic as elements and in compounds.
>
> 2. Typical used oil storage, collection and transportation practices often result in related wastes, such as antifreeze and solvents, being mixed in with used oil. Furthermore, used oil is sometimes deliberately contaminated, thus serving as a 'mask' for such toxic substances as dioxin, nitrobenzene, and cyanide.
>
> 3. Over 800 million gallons of used oil are generated in the United States each year.
>
> 4. Used oil applied to the land (e.g., as a road oil, dust suppressant, or when indiscriminately dumped) poses an environmental hazard resulting from the direct release of the oil onto the land, and through percolation and run-off into ground and surface waters.
>
> 5. Used oil disposed of in insecure landfills may also leach through the bottom of such landfills, and subsequently contaminate ground water supplies.

6. Because of the presence of contaminants, uncontrolled burning of certain used oils, either as a fuel or for the purpose of thermal disposal, may result in significant levels of hazardous emissions to the environment. This, in turn, may expose humans, wildlife, and vegetation in the area to these harmful substances.

7. Many of the contaminants in used oil are persistent, bioaccumulative, or have potential for increased penetration of the respiratory tract, thus magnifying the possibility of exposure and harm.

8. Improper management of waste oil has caused many actual damage incidents.

The Agency believes that all of these considerations support the listing of used automotive and industrial oils as toxic (T) hazardous wastes.

Used automotive oils will be listed as a hazardous wastes based on the following constituents: polynuclear aromatic hydrocarbons (including benzo(a)pyrene and benz(a)anthracene); chlorinated naphthalene; chlorinated benzenes; nitrosamines; lead; barium; chromium and cadmium. ...[A]ll industrial oil will be listed as a hazardous waste based on its aromatic oil component.[387]

The report provides the following conclusion:

[T]he Administrator has determined that the following waste oils are hazardous wastes, and thus should be subject to the regulations prescribed under Sections 3002 through 3004 of RCRA:

1. Oil spilled to land, and oily debris generated from cleaning-up spills to land or surface water [unused waste oil];
2. Used automotive oils; and
3. Used industrial oils.

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[387] Id. at pages 76-78.

> The exception to this are any of the above waste oils whose petroleum base is white oil.[388]

Even though the required Report to Congress submitted by EPA contains the Agency's strong intent to list used automotive and industrial oils as hazardous waste, these efforts met resistance from the Reagan Administration in the form of a directive from the Office of Management and Budget to EPA to conduct a regulatory impact analysis of the costs associated with such action. The resulting analysis[389] indicated that the listing of used oil under RCRA could impose substantial costs on industry, particularly for the permitting of an estimated 500,000 used oil storage facilities. The end result was that the Agency took no further regulatory action pursuant to section 7 or 8(1) of the UORA.

(c) The Hazardous and Solid Waste Amendments of 1984

On November 8, 1984, Congress passed the Hazardous and Solid Waste Amendments of 1984[390] (hereafter "1984 Amendments"). In order to prod EPA to continue its efforts toward regulating used oil and to provide additional direction regarding these future efforts,[391] Congress in the 1984 Amendments amended section 3012

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[388] Id. at page 4.

[389] PEPCo Environmental Inc., "A Risk Assessment of Waste Oil" (1983).

[390] P.L. 98-616, Section 241, 98 Stat. 3258 (November 8, 1984).

[391] See H.R. Rep. No. 198, 98th Cong., 1st Sess. 64 (1983); and H.R. Rep. No. 1133 (Conference Report), 98th Cong., 2d Sess. 113 (1984)

of RCRA in several significant aspects. The relevant changes, with respect to used oil, made by the 1984 Amendments include the renumbering of section 3012 of RCRA as 3014 and the addition of new provisions to this section. These new provisions, which altered EPA's basic mandates in this area, taken along with the original provisions of section 3012[392] (which incorporated section 7 of the UORA), establish the requirements for the regulation of used oil which are now embodied in section 3014 of Subtitle C of RCRA.

First, these new provisions added the phrase "consistent with the protection of human health and the environment" to the last sentence of the original version of section 7 of the UORA (which was the pre-1984 Amendments section 3012 of RCRA and presently section 3014(a) of RCRA, 42 U.S.C. section 6935(a)). The last

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which states, "The Congress is including this provision because of EPA's failure to promulgate regulations in regard to recycling of oil as directed in the Used Oil Recycling Act of 1980. There is abundant evidence of harm due to improper recycling of used oil, such as incidents at Times Beach, Missouri, involving dioxin-contaminated used oil sprayed onto roads; incidents of used oil contaminated with other hazardous wastes being burned in large quantities for heating purposes; and the many used oil recycling sites on the list of Superfund National Priority Sites. At the same time, however, used oil, when properly recycled, can be a valuable resource, although there is at present little incentive for investment in safe recycling technologies because of existing regulatory uncertainty and inadequate regulatory coverage. This provision is designed to reduce the uncertainty and the gaps in the regulatory treatment of used oil by mandating a regulatory scheme that will assure that used oil is properly recycled."

[392] See H.R. Rep. No. 198, 98 th Cong., 2d Sess. 64 (1984), which indicates that the Congressional intention of the 1984 Amendments was to "supplement but do not overrule existing section 3012 of RCRA."

sentence of this provision as amended now reads, "The Administrator shall ensure that such regulations do not discourage the recovery or recycling of used oil consistent with the protection of human health and the environment."[393] This addition altered EPA's mandate with respect to the regulation of used oil so that the Agency's prime consideration in this area is now the protection of human health and the environment.[394] This provision thus empowered the Agency to discourage certain types of used oil recycling in order to provide the required protection.[395] Congress also made clear that this new addition did not affect the Agency's authority to regulate recycled oil that is not identified or listed, and that it could do so under the same standards established for used oil that is identified or listed.[396]

Second, the provisions of the new section 3014(b)[397] of RCRA required the Administrator to propose whether to list or identify used automobile and truck crankcase oil as a hazardous waste under section 3001 of this title by November 8, 1985, and to finalize that proposal as well as determine whether other used oil should be listed or identified as hazardous wastes under section 3001 of this title by November 8, 1986.[398]

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[393] See, supra note 381, and the accompanying text for the complete version of the original section 7 of the UORA.

[394] See H.R. Conf. Rep. No. 1133, 98th Cong., 2d Sess. 114 (1984); and 50 FR 49258 (November 29, 1985) at 49260.

[395] Id.

[396] See H.R. Rep. No. 198, 98th Cong., 1st Sess. 64 (1983).

[397] 42 U.S.C. section 6935(b).

[398] See 50 FR 49258 (November 29, 1985) at 49260; The specific

Should the Administrator decide to identify or list any used oil under the provisions of section 3014(b) of RCRA, the new section 3014(c) and (d) of RCRA would then require the promulgation of special regulations for the used oil identified or listed as a hazardous waste and which is recycled. Section 3014(c)(2)(B) exempts generators of recycled oil from the manifest, record keeping and reporting requirements that would otherwise apply to hazardous wastes, provided that provisions for the delivery of such used oil to a permitted used oil recycler have been arranged and the used oil is not mixed by the generator with other types of hazardous wastes. The provision for these special regulatory standards applicable to recycled used oil was provided by Congress for the dual statutory purposes of protecting public health and the environment and, to the extent possible within that context, not discouraging used oil recycling.[399]

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provisions of section 3014(b) of RCRA, 42 U.S.C. section 6935(b) are as follows: "IDENTIFICATION OR LISTING OF USED OIL AS HAZARDOUS WASTE.--Not later than 12 months after the date of enactment of the Hazardous and Solid Waste Amendments of 1984 the Administrator shall propose whether to list or identify used automobile and truck crankcase oil as hazardous waste under section 3001. Not later than 24 months after such date of enactment, the Administrator shall make a final determination whether to list or identify used automobile and truck crankcase oil and other used oil as hazardous wastes under section 3001."

[399]See 50 FR 49258 (November 29, 1985) at 49260; H.R. Rep. No 198, 98th Cong., 1st Sess. 64 (1983) which expressed the concerns of Congress for avoiding environmentally counter productive results like dumping should the resulting regulations for recycling be too stringent; and 42 U.S.C. 6935(c)(2) (A) which states, "In promulgating such regulations with respect to generators, the

The legislative history of the 1984 Amendments indicates Congress intended that EPA retain the authority, originally contained in section 7 of the UORA and now provided under section 3014(a) of RCRA, to regulate recycled oil even if the Agency does not regulate recycled oil as a hazardous waste.[400]

Section 3014(d) of RCRA provides that the owner or operator of a facility that recycles used oil is subject to the section 3004 hazardous waste standards but is deemed to have a RCRA permit provided the recycling facility complies with the management standards promulgated by the Administrator under section 3004.[401] Section 3014(d) provides the Administrator with authority to require such owners or operators to obtain an individual permit under section 3005(c) if he determines than an individual permit is necessary to protect human health and the environment.[402]

Several other changes were made to RCRA by the 1984 Amendments which affected used oil. Section 3010(a) of RCRA requires all persons producing, marketing, distributing or burning

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Administrator shall take into account the effect of such regulations on environmentally acceptable types of used oil recycling and the effect of such regulations on small quantity generators and generators which are small businesses (as defined by the Administrator)."

[400] H.R. Rep. No. 198, 98th Cong., 1st Sess. 64 (1983).

[401] 42 U.S.C. 6935(d)(2) provides "Notwithstanding any other provision of law, any generator who recycles used oil which is exempt under subsection (c)(1) shall not be required to obtain a permit under section 3005(c) with respect to such used oil until the Administrator has promulgated standards under section 3004 regarding the recycling of such used oil."

[402] See 50 FR 49258 (November 19, 1985) at 49260.

used oil fuels[403] to notify the EPA of their existence within 15 months of enactment. Section 3004(q) of RCRA requires the Administrator to promulgate regulations for the production, distribution and burning of "hazardous waste fuels" within two years of enactment. This provision affects used oil because it defines hazardous waste fuel to include any fuel produced *from any* hazardous waste identified or listed under section 3001, or *from any* hazardous waste identified or listed under section 3001 and any other material. This other material is commonly used oil.[404]

A previously existing provision, section 3001(b)(3),[405] was incorporated into both sections 3004(q) and 3010 with the identical language of, "Nothing in this subsection shall be construed to affect or impair the provisions of section 3001(b)(3)."[406] Section 3001(b)(3)(A), which was introduced by Representative Bevill and is now known as the "Bevill Amendment," excludes temporarily from regulation as a hazardous waste under Subtitle C of RCRA certain high volume and low hazard wastes,[407] until the Agency can complete studies for these wastes.[408] This provision is significant

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[403] 42 U.S.C. 6930(a)(1)(C) and (D) indicates that "Used oil fuels" includes used oil burned directly to recover energy and a fuel produced from used oil combined with any other material (often referred to as "used oil derived fuel"). See also 50 FR 49164 (November 29, 1985) at 49174 for EPA's discussion of the "Definition of Used Oil Fuel".

[404] See, supra note 391.

[405] 42 U.S.C. section 6921(b)(3)(A).

[406] RCRA sections 3004(q)(1)(C) and 3010(a)(3).

[407] 43 FR 58992 (December 18, 1978).

[408] Section 3001(b)(3)(A) provides, "Notwithstanding the provisions of paragraph (1) of this subsection, each waste listed below shall...

to the issue of used oil because, "The Agency has temporarily interpreted this exclusion to mean that the following solid wastes are not hazardous wastes: 'fly ash, bottom ash, boiler slag and flue gas emission control wastes resulting from (1) the combustion solely of coal, oil, or natural gas, (2) the combustion of any mixture of these fossil fuels, or (3) the combustion of any mixture of coal and other fuels, including hazardous waste or used oil fuels, up to a 50 percent mixture of such other fuels'."[409] The basis for this provision and its interpretation is that the concentration levels of toxic constituents in the waste would be primarily a product of the substances specified in section 3001(b)(3)(A).[410]

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be subject only to regulation under other applicable provisions of Federal or State law in lieu of this subtitle until at least six months after the date of submission of the applicable study required to be conducted under subsection (f), (n), (o), or (p) of section 8002 of this Act and after promulgation of regulations in accordance with subparagraph (C) of this paragraph: (i) Fly ash waste, bottom ash waste, slag waste, and flue gas emission control waste generated primarily from the combustion of coal or other fossil fuels. (ii) Solid waste from the extraction, beneficiation, and processing of ores and minerals, including phosphate rock and overburden from the mining of uranium ore. (iii) Cement kiln dust waste."

[409] 50 FR 49164 (November 29, 1985) at 49190, note that footnote 87 to this preamble states as a partial basis for this interpretation, "Mixtures of coal and up to 50 percent of other fuels are excluded from regulation (at this time) because any contaminants from the other fuels (e.g., hazardous waste) would be largely diluted by the coal combustion residuals."

[410] Id.

VI. CURRENT REGULATORY STATUS: EPA'S 1985 ACTIONS TO IMPLEMENT THE REVISED STATUTORY REQUIREMENTS FOR USED OIL

(a) EPA's Final Rule for the Burning of Waste Fuel and Used Oil Fuel in Boilers and Industrial Furnaces

On January 11, 1985, in order to perform the requirements established by sections 3004(q) and 3014 of RCRA, EPA proposed under Subtitle C of RCRA to begin regulation of hazardous waste and used oil burned for energy recovery in boilers and industrial furnaces.[411] The proposal provided administrative controls for those persons who market and burn hazardous waste and used oil fuels. On November 29, 1985, most of the proposed requirements were finalized,[412] with some modifications made in response to comments received during the rule making process.[413]

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[411] 50 FR 1684 (January 11, 1985) "Hazardous Waste Management System: Standards for the Management of Specific Wastes and Specific Types of Facilities," (Action: Proposed rule and request for comment.).

[412] 50 FR 49164 (November 29, 1985), "Hazardous Waste Management System; Burning of Waste Fuel and Used Oil Fuel in Boilers and Industrial Furnaces," (Action: Final rule, codified at 40 C.F.R. Parts 261, 264, 265, 266, and 271), at 49176 footnote 32 states, "EPA is adopting the used oil fuel specification for nonindustrial boilers in advance of other rules for recycled oil to meet the most pressing environmental concern with respect to recycled oil management, and because the prohibitions on hazardous waste burning would have little practical significance unless coupled with controls on burning recycled oils."

[413] Id.

The primary purpose of the final rule is to prohibit the burning in nonindustrial boilers of both hazardous waste fuel and of used oil that does not meet specification levels for certain hazardous contaminants and flash point.[414] The provisions of the final rule are implemented and enforced by providing administrative controls to keep track of marketing and burning activities.[415] These controls include notification to EPA of waste-as-fuel activities, use of a manifest, or, for used oil, an invoice system for shipments, and recordkeeping.[416] Hazardous waste fuels, including processed or blended hazardous waste fuels, are also subject to storage requirements.[417]

The specifics of the primary regulations affecting used oil are found at 40 C.F.R. Part 266, Subpart D, for "Hazardous Waste Burned for Energy Recovery," and 40 C.F.R. Part 266, Subpart E, for "Used Oil Burned for Energy Recovery."[418] Under these regulations hazardous waste fuels and used oil fuels are under somewhat different controls.

The prohibition on the burning of fuels derived from hazardous waste in nonindustrial furnaces and boilers is implemented and enforced by controls imposed on marketers and burners of such fuels.[419] The "standards applicable to marketers of hazardous

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[414] 50 FR 49164; and 40 C.F.R. sections 266.31(b) and 266.40(e).

[415] 40 C.F.R. sections 266.43(b)(6) and 266.44(d)(2) and (e).

[416] 40 C.F.R. sections 266.34(b), 266.35(b), 266.43(b)(3), and 266.44(b).

[417] 40 C.F.R. sections 266.34(c) and 266.35(c).

[418] The source for the regulations is 50 FR 29204 (November 29, 1985).

waste fuel" include: (1) the prohibitions under section 266.31(a), including only selling hazardous waste fuel to persons who will burn it in approved devices and who have notified the Agency of their hazardous waste fuel activities; (2) notification of EPA of hazardous waste fuel activities; (3) compliance with applicable storage and off-site shipment standards; (5) obtaining the required notices from burners and marketers; and (5) complying with the applicable recordkeeping requirements.[420] The "standards applicable to burners of hazardous waste fuel" contained in 40 C.F.R. 266.35 provide for similar prohibitions, notification, storage, notice and recordkeeping requirements.

In promulgating these regulations, EPA did retain the exemption for the residues and ash resulting from the burning of hazardous waste fuel and used oil, provided the furnaces used for this cogeneration operation also produce the solid wastes that are temporarily exempt from regulation under RCRA section 3001(b)(3)(A).[421]

The most important aspect of the regulations for used oil fuels[422] is the setting of specifications for these fuels based upon the maximum allowable levels of particular contaminants and hazardous properties under 40 C.F.R. section 266.40(e) which states:

Except as provided by paragraph (c) of this section, used

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[419] 40 C.F.R. sections 266.31-35.

[420] 40 C.F.R. section 266.34.

[421] 50 FR 49164 (November 29, 1985) at 49190 and footnotes 87-89; also see, supra notes 405-410, and accompanying text.

[422] 40 C.F.R. Subpart E "Used Oil Burned for Energy Recovery."

oil burned for energy recovery, and any fuel produced from used oil by processing, blending, or other treatment, is subject to regulation under this subpart unless it is shown not to exceed any of the allowable levels of the constituents and properties in the specification shown in the following table. Used oil fuel that meets the specification is subject only to the analysis and recordkeeping requirements under section 266.43(b)(1) and (6).[emphasis added] Used oil fuel that exceeds any specification level is termed "off-specification used oil fuel".

[Table]

USED OIL EXCEEDING ANY SPECIFICATION LEVEL IS SUBJECT TO THIS SUBPART WHEN BURNED FOR ENERGY RECOVERY (The specification does not apply to used oil fuel mixed with a hazardous waste other than small quantity generator hazardous waste.)

Constituent/property	Allowable level
Arsenic	5 ppm maximum
Cadmium	2 ppm maximum
Chromium	10 ppm maximum
Lead	100 ppm maximum
Flash Point	100°F minimum
Total Halogens	4,000 ppm maximum

(Used oil containing more than 1,000 ppm total halogens is presumed to be a hazardous waste under the rebuttable presumption provided under section 266.40(c). Such used oil is subject to Subpart D of this part rather than this subpart when burned for energy recovery unless the presumption of mixing can be successfully rebutted.)

Therefore under the above regulatory provision and the referenced sections, used oil that exceeds these specifications may not be burned in nonindustrial boilers, and marketers and industrial burners of these "off-specification fuels" must comply with the fairly burdensome administrative requirements of 40 C.F.R. sections 266.43 and 266.44. In contrast, used oil which meets the

specifications can be burned in any type of boiler or furnace (e.g., boilers located in hospitals, schools, and apartment and office buildings) and except for the minor analysis and recordkeeping requirements of 40 C.F.R. section 266.43(b)(1) and (6),[423] is exempt from any significant regulatory requirements.[424]

The limitation on nonindustrial boilers and furnaces to used oil fuels meeting the above specification was based upon the assumption that most of these facilities are generally very small and do not achieve complete combustion of the toxic organic materials contained in the used oil fuels.[425] An additional consideration is the fact that these nonindustrial facilities are generally not equipped with emission control apparatus, which further increases the risk of introducing hazardous components into the atmosphere.[426]

The EPA selected these specifications based on "typical contaminants of used oil and proposed specification levels for those compounds found in higher concentrations in used oil than in virgin

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[423] These requirements apply only to marketers of used oil fuel. Section 266.43(b)(1) states that the used oil fuel is subject to regulation under Subpart E unless the marketer obtains data that the used oil fuel meets the specifications provided under section 266.40(e). Section 266.43(b)(6) requires that the first marketer who makes such a claim must keep certain information about this action. There are also requirements for marketers and burners to comply with certain similar standards under 40 C.F.R.sections 266.43 and 266.44.

[424] See 50 FR 49164 (November 29, 1985) at 49180.

[425] Id.

[426] Mueller Associates, supra note 22, at page 158.

refined fuel oil [except for lead] and which could also pose a significant health risk when burned."[427] The Agency's rationale for this approach was that if it proposed specification levels for compounds found in used oil at the same or lower levels than are found in virgin refined fuel oil, users could simply switch to virgin oil to replace the recycled product without any environmental benefit.[428]

Total halogens were not in the rule as proposed, but were added in response to comments and further study. It was determined that burning fuels with high chlorine levels can have direct and indirect effects on human health and the environment including: (1) increased ambient levels of of hydrochloric acid and thus acid rain; (2) accelerated corrosion of boiler components which could decrease combustion efficiency resulting in increased emissions of incompletely burned combustion products; and (3) accelerated corrosion of any air emissions control equipment thus reducing control efficiency and directly increasing emissions of pollutants.[429] The specification level of 4,000 ppm for total halogens was based on halogen levels in high chlorine coal, since it was believed that limiting halogen levels to the highest levels found in fossil fuels would ensure that burning used oils with equivalent or lower halogen levels would not accelerate corrosion rates.[430]

Used oil containing more than 1000 ppm of total halogens is

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[427] 50 FR 49164 (November 29, 1985) at 49181.

[428] Id. at 49180

[429] Id.

[430] Id.

presumed to be a hazardous waste because it has been mixed with listed halogenated hazardous waste.[431] This presumption may be rebutted by demonstrating that the used oil does not contain hazardous waste; however, the burden of proof is on the person possessing the used oil.[432] An additional rationale for the selection of halogens for the rebuttable presumption is that spent halogenated solvents are common hazardous wastes which are frequently mixed either accidentally or intentionally into used oil, and thus can often be illegally disposed of without detection.[433]

PCB's were in the original specification proposal, but were dropped from the final rule because commenters indicated that the cross-reference between the proposed regulations and the rules regulating PCB's under the Toxic Substances Control Act (TSCA)[434] would cause confusion, and that setting a specification level could encourage dilution of PCB's in an attempt to avoid regulation under TSCA.[435]

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[431] 40 C.F.R. section 266.40(c).

[432] Id.

[433] 50 FR 49164 (November 29, 1985) at 49176.

[434] 15 U.S.C.A. section 2601 et seq., P.L. 94-469, October 11, 1976, as amended by P.L. 97-129, December 29, 1981; P.L. 98-620, November 8, 1984; and P.L. 99-519, October 22 1986. Note the use of used oils containing any concentration of PCB's and the disposal of used oils containing 50 ppm or greater of PCB's are subject to the TSCA PCB rules promulgated under 40 CFR Part 761. Under the current TSCA PCB rules, the use of used oils containing any concentration of PCB's is prohibited and the disposal of used oil containing 50 ppm or greater PCB's is strictly controlled.

[435] 50 FR 49164 (November 29, 1985) at 49182. Note that dilution to avoid regulation is expressly prohibited under the TSCA rules (40 C.F.R. section 761.1(b)).

The specification concentration level for lead was based on the fact that levels higher than 100 ppm could result in ambient lead levels exceeding the National Ambient Air Quality Standard (NAAQS) for lead in densely populated areas where boilers are clustered together and receptors may be close to the sources.[436]

The final rule does not prohibit the blending of used oil (e.g., blending with virgin oil) to meet the used oil fuel specification. The EPA expressed the following primary reasons for this decision: (1) highly contaminated used oils cannot be economically blended (because the specification requires such low levels of contaminants) and will go to re-refining or to industrial boilers or industrial furnaces that control metal emissions; (2) it is unclear whether or not re-refineries and the industrial fuel market have the capacity to handle the used oil exceeding the specification if blending is not allowed, and the diverted used oil would be incinerated or dumped; (3) although blending does not reduce (in theory) mass-emissions in an urban area, blending of used oil to meet the specification reduces the risk to the most exposed individuals (MEI); and (4) blending results in a product that poses no greater hazard than dirty virgin fuel oil.[437]

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[436] Id. at 49184 which also notes that, "Although 100 ppm appears to be protective with respect to the NAAQS, that level may not be protective because health effects data available since the lead NAAQS was established indicate that lead causes serious, but apparently noncancerous, health effects at any level of exposure (i.e., lead appears to be a "nonthreshold" pollutant). EPA is considering these new health effects data in its current efforts to determine whether the existing lead NAAQS is adequately protective."

The final rule also provides two important exceptions to the general provision for the regulation under Subpart D ("Hazardous Waste Burned for Energy Recovery") for used oil which is a hazardous waste and which is burned for energy recovery.[438]

The first exception is for used oil burned for energy recovery and which is a hazardous waste solely because it "exhibits a characteristic of hazardous waste identified in Subpart C of Part 261 [Chapter I of 40 C.F.R.] provided that it is not mixed with a hazardous waste."[439]

This exception relates to the problem of "distinguishing between used oil and hazardous wastes"[440] which was also addressed by the EPA in the preamble to the final rule. The problem arises in situations where it is difficult to tell if a waste is used oil or a hazardous waste, because in order to do so one must first determine whether the used oil was mixed with a hazardous waste, or whether the oil became contaminated during its use. This distinction is important because the legislative history of the UORA clearly indicates "that used oil that is contaminated during use is to

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[437] Id. at 49189.

[438] 40 C.F.R. section 266.40(d); also see 50 FR 49164 (November 29, 2985) at 49178-49181 for a detailed discussion of these exceptions. The exception allows regulation under Subpart E "Used Oil Burned for Energy Recovery" rather than the more restrictive Subpart D "Hazardous Waste Burned for Energy Recovery". Regulation under Subpart E allows the used oil fuel to meet the used oil fuel specification and to obtain the benefit of any other special regulations pertaining to used oil fuel.

[439] 40 C.F.R. section 266.40(d) (1).

[440] 50 FR 49164 (November 29, 1985) at 49175.

be classified as used oil and, if recycled, be subject to regulation under section 3014."[441] In contrast, used oil known to be mixed with a characteristic hazardous waste is regulated as hazardous waste fuel if the mixture exhibits a characteristic.[442] Therefore, if a used oil fuel exhibits a characteristic due to its use it is regulated as a used oil, and thus can be burned in nonindustrial boilers, provided it meets the used oil fuel specification.[443] In contrast, a used oil which exhibits a characteristic due to mixing with a hazardous waste is regulated as a hazardous waste fuel, and thus cannot qualify for the special rules pertaining to used oil.[444] In order to help deal with this difficult distinction the EPA set forth the rebuttable presumption, which was discussed earlier in this subsection, that used oil fuel that contains more than 1000 ppm total halogens is presumed to be mixed with a hazardous waste and thus is a hazardous waste.[445]

The second exception is for used oil burned for energy recovery and which is a hazardous waste solely because it "contains hazardous waste generated only by a person subject to the special requirements for small quantity generators under section 261.5 [of

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[441] Id., the legislative history referenced in this discussion is H.R. Rep. No. 96-1415 at 6.

[442] Id. at 49180.

[443] Id. states the Agency's rationale for this position as, "Although such used oils are exempt from regulation and may be burned in nonindustrial boilers, the specification ensures that such burning would not pose significantly greater risk than burning virgin fuel oil."

[444] Id. at 49175-49180.

[445] Id.

Chapter I of 40 C.F.R.]."[446] Normally these small quantity generator wastes are completely exempt from RCRA Subtitle C regulation;[447] however, this exception retains some regulatory control by requiring that any used oil fuel to which hazardous waste are added remains subject to the used oil fuel regulations.[448]

These regulations prompted two significant actions in the used oil community. First, EPA received three petitions from entities[449] involved in the processing of used oil for use as fuel requesting the delay of the effective date of the 100 ppm lead limit. The basis for

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[446] 40 C.F.R. section 266.40(d)(2); 40 C.F.R. section 261.5(a) states a small quantity generator is a generator who generates no more than 100 kilograms of hazardous waste in a month.

[447] 40 C.F.R. section 261.5(a) and (b).

[448] 40 C.F.R. section 266.40(d)(2); 50 FR 49164 (November 29, 1985) at 49179 states the Agency's reason for keeping these wastes subject to the used oil fuel regulations as, "To do otherwise would create the very situation feared by the commenters whereby the rules would create an incentive to adulterate and be much more difficult to enforce. This is because if small quantity generator waste could be mixed with otherwise-regulated used oil and the mixture was exempt from regulation, people undoubtedly would take advantage of the opportunity to escape regulation, or raise the issue of mixing as a defense in enforcement actions. Potentially large volumes and percentages of recycled used oil could go unregulated, in derogation of Congressional intent."

[449] 52 FR 2696 (January 26, 1987) at 2696 identifies these three entities as (1) The National Oil Recyclers Association (NORA) which requested that EPA postpone the effective date of the 100 ppm lead limit until such time as at least 80 percent of used oil samples, on a nationwide basis, meet the limit; (2) Midwest Oil Refining Company which requested that EPA rescind the burner notification requirement or, as and alternative, delay the lead limit as NORA recommends; and, (3) The Association of Environmentally Regulated Connecticut Industries which requested a delay of the lead limit until September 30, 1986, or later.

this request was that these organizations felt that the EPA's requirements were adversely impacting the used oil fuel market, causing them economic hardship and ultimately leading to improper disposal of used oil.[450] The petitions indicate that the industrial burners, to which members of the petitioning organizations market their used oil fuel, are reluctant to notify EPA that they are burning off-specification used oil fuel, and that the reduced demand for used oil fuel will lead to the collapse of the used oil recycling system and to widespread uncontrolled disposal of oil.[451]

On January 26, 1987, EPA published its tentative determination to deny the petitions.[452] EPA based this determination on the fact that it established the limit to prevent health effects, and the fact that this limit was not based on a percentage of samples meeting the limit as the petitioners claim.[453] In addition, the Agency noted that the notification requirement is by no means a burdensome requirement, and therefore, does not adversely affect used oil recycling.[454]

The second reaction in the used oil community was a suit filed against the EPA by the Hazardous Waste Treatment Council[455] in The

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[450] Id.

[451] Id.; 40 C.F.R. 266.35 requires burners of hazardous waste fuel to notify EPA of hazardous waste fuel activities.

[452] See 52 FR 2695 (January 26, 1987).

[453] Id. at 2697.

[454] Id. at 2698.

[455] Hazardous Waste Treatment Council, et al., v. U.S. Environmental Protection Agency and Lee M. Thomas, Administrator, No. 86-1143 (U.S. Court of Appeals for the District of Columbia Circuit, 1988).

United States Court of Appeals for the District of Columbia Circuit, with oral arguments heard on March 9, 1988. The basic content of the oral arguments was that the EPA in its November 29, 1985, final rule had failed to adequately regulate used oil fuels and hazardous waste fuels as directed by Congress.[456]

(b) EPA's 1985 Proposed Recycled Used Oil Standards and Identification and Listing of Used Oil as a Hazardous Waste

In conjunction with finalizing the rule for the burning of waste fuel and used oil fuel on November 29, 1985, EPA on that same day issued two proposed rules which were closely related to each other

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As of September 1, 1988, the Court had not published a decision. The Hazardous Waste Treatment Council is a national trade association of over 60 commercial firms that use advanced and established treatment technologies for the management of hazardous waste, and supporting equipment manufacturers.

[456] See Id. at Respondent's Brief pages 1 and 2 which provides the following summary of the primary issues presented in this case concerning the reasonableness of the Agency's actions in issuing the final rule as contained at 50 FR 49164: (1) the reasonableness of regulating used oil fuel that exhibits a characteristic of hazardous waste under the used oil fuel regulations rather than under the hazardous waste fuel regulations; (2) the reasonableness of regulating used oil fuel mixed with hazardous wastes from small quantity generators under the used oil fuel regulations rather than under the hazardous waste fuel regulations; (3) the reasonableness of promulgating specifications for toxic constituents in used oil fuel while not prohibiting used oil fuel marketers from meeting these specifications by blending the used oil with other materials; and (4) the reasonableness of the Agency's interpretation of RCRA section 3001(b)(3) when it stated that residues generated by utility boilers, cement kilns and mining furnaces that burn hazardous waste fuel can continue to be within the scope of that exemption.

and to the final rule on burning. The first was the proposed "Recycled Used Oil Standards,"[457] which accompanied and complemented the proposed "Identification and Listing of Hazardous Waste; Used Oil."[458]

Pursuant to section 3014 of RCRA,[459] which requires EPA to establish standards for used oil that is recycled, the Agency proposed "Recycled Used Oil Standards"[460] that included provisions for: (1) cradle-to grave tracking requirements when used oil is shipped off-site for recycling; (2) facility management requirements when used oil is stored prior to recycling; (3) record keeping requirements on all persons managing recycled oil; (4) regulation of uses of recycled oil that constitute disposal as land disposal; and (5) the outright prohibition of road oiling.

The second and most controversial proposal was to amend the regulations for hazardous waste management under Subtitle C of RCRA, by listing used oil as a hazardous waste.[461] EPA stated as the rationale for this proposal its determination that:

> used oil typically and frequently contains significant quantities of lead and other metals, chlorinated solvents, toluene, and naphthalene which would pose a substantial hazard to human health and the environment, if

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[457] 50 FR 49212 (November 29, 1985), "Hazardous Waste Management System: Recycled Used Oil Standards," (Action: Proposed rule.).

[458] 50 FR 49258 (November 29, 1985), "Hazardous Waste Management System; General; Identification and Listing of Hazardous Waste; Used Oil," (Action: Proposed rule.).

[459] 42 U.S.C. 6935.

[460] 50 FR 49212 (November 29, 1985).

[461] 50 FR 49258 (November 29, 1985).

improperly managed.[462]

In addition to this introductory rationale, EPA summed up its "Basis for Listing Used Oil as a Hazardous Waste" with the following:

> In summary, the Agency has determined that used oil typically contains toxic constituents at concentrations that are of concern, that, these constituents are mobile, persistent, and bioaccumulative, and capable of migration in hazardous concentrations, and, therefore, that these wastes are capable of causing (indeed, repeatedly have caused) substantial harm if mismanaged. Consequently, the Agency is proposing to add used oil to the lists of hazardous wastes.[463]

This EPA determination was based on analytical data from approximately 1000 used oil samples that indicated that a number of toxic constituents are typically and frequently present in used oil at levels of regulatory concern,[464] either as a direct result of use or subsequent adulteration, and that these toxicants have the potential to migrate from the used oil and to escape into the environment.[465]

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[462] Id. at 49258.

[463] Id. at 49267.

[464] Id. at 49265-6 states that, "Based on the Agency's survey of used oil samples, the following contaminant levels were reported at the statistical 90th percentile for the constituents of concern. [N]aphthalene was reported at 990 ppm, tetrachloroethylene at 1300 ppm, 1,1,1-trichloroethane at 3100 ppm, trichloroethylene at 1000 ppm, and toluene at 5000 ppm . . .Arsenic at 19 ppm; cadmium at 10 ppm; chromium at 30 ppm; and lead at 1200 ppm. These levels have been shown to pose a potential substantial hazard to human health and the environment when burned in an incinerator or boiler." Note, at the statistical 90th percentile, 90 percent of all of the samples will contain that constituent at that value or lower.

The Agency noted that these constituents of concern are known to be carcinogenic, mutagenic, teratogenic, or have other chronic or acutely toxic properties, and that they are frequently present in used oil at levels ranging from 100 to 10,000,000 times higher than any health-based standard; therefore, "only a small percentage of the toxicants would need to migrate from the waste and escape into the environment at levels above the reported health-based standard to pose a substantial hazard to human health and the environment."[466]

This proposal, in addition to listing used oil as a hazardous waste under RCRA, provided: (1) a regulatory definition of used oil;[467] (2) two modifications to the mixture rule to exempt certain mixtures of used oil from regulation;[468] and (3) because used oil

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[465] Id. at 49260.

[466] Id. at 49265.

[467] 50 FR 49258 (November 29, 1985) at 49261 states, "EPA is proposing a definition in 40 CFR 260.10 for 'used oil' as follows: 'Used Oil' is petroleum-derived or synthetic oil including, but not limited to, oil which is used as a: i) Lubricant (engine, turbine, or gear); ii) Hydraulic fluid (including transmission fluid); iii) Metalworking fluid (including cutting, grinding, machining, rolling, stamping quenching, and coating oils;) or iv) Insulating fluid or coolant, and which is contaminated through use or subsequent management."

[468] 50 FR 49258 (November 29, 1985) at 49263-4 provides the following proposed modifications to the existing mixture rule. Under the general hazardous waste rules, a mixture of small quantities of a hazardous waste and a non-hazardous waste would be conditionally exempt from regulation and thus not subject to the hazardous waste rules; however, under the proposed rule a mixture of used oil and small quantities of another hazardous waste (as defined in section 261.5) will be fully regulated as a hazardous waste and not a used oil. Consequently, mixtures of used oil and

would become a hazardous substance under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA),[469] the EPA proposed to adjust the statutory one pound CERCLA reportable quantity (RQ) to 100 pounds for used oil.[470]

The Agency provided the following summary of the two proposals' effects on the used oil industry:

> The effect of today's proposal, if promulgated, would be to control the treatment and disposal of used oil (as well as its transportation, accumulation, or storage prior to treatment or disposal), by subjecting it to full hazardous waste regulation under Subtitle C of RCRA. At the same time, most used oil that is recycled would be subject to the special management standards for recycled oil being proposed in another Section of today's Federal Register.[471]

The EPA stated that the "proposed listing of used oil as a

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other hazardous wastes (including small quantities of hazardous wastes) will be hazardous wastes subject to full regulation under Subtitle C when that mixture is disposed, except as provided in Sections b and c, below. An exception to regulation as a used oil (and hence, as a hazardous waste) is provided under: (1) Section b for "a mixture of a non-hazardous wastewater and used oil caused by a de minimis loss of lubricating oil, hydraulic or metal working fluids, or insulating fluids or coolants due to spills or drippings; and (2) Section c for "industrial wipers that are contaminated with used oil."

[469] 42 U.S.C.A. section 9601 et seq.; CERCLA was created by P.L. 96-510, and amended by P.L. 97-216, July 18, 1982; P.L. 97-272, September 30, 1982; P.L. 98-45, July 12, 1983; P.L. 99-160, November 25, 1985; and P.L. 99-499 (Superfund Amendments and Reauthorization Act of 1986), October 17, 1986.

[470] 50 FR 49258 (November 29, 1985) at 49267-8.

[471] Id. at 49258.

hazardous waste is based simply on EPA's determination that used oil meets the criteria for listing under section 3001 of RCRA [40 CFR 261.11(a)(3)]."[472] The Agency then warned that persons interested in commenting on the listing and/or on the section 3014 standards should note that the scope of the notice proposing to list used oil as a hazardous waste was different from that of the accompanying notice which proposed specific standards for the management of recycled oil under section 3014.[473] The EPA specified that while "the main issue relevant to the proposed listing of used oil is whether used oil meets the criteria for listing contained in section 261.11(a)(3) ...[the second proposal, for the standards under which to regulate used oil recycling] seeks to address the broader issues concerning the extent of regulation that should be imposed on used oil recycling practices in order to protect human health and the environment and, to a lesser degree, the specific impacts of the regulation on the various segments of the recycling industry."[474]

During the public hearing on these proposed rules numerous commenters suggested that EPA consider a regulatory option of only listing used oil as a hazardous waste when disposed of, while retaining the proposed special management standards for used oil that is recycled.[475] The vast majority of speakers urged the Agency

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[472] Id. at 49260.

[473] Id.

[474] Id.

[475] 51 FR 8206 (March 10, 1986), "Hazardous Waste Management System; Identification and Listing of Hazardous Waste," (Action:

not to list used oil as a hazardous waste when the oil is recycled because if recycled used oil were listed as a hazardous waste, it could discourage used oil recycling due to concerns associated with the term "hazardous waste."[476] The commenters argued:

> that by calling used oil which is recycled a hazardous waste, it would lead to increased disposal and dumping of used oil (especially uncontrolled do-it-yourself (DIY) used oil) and, therefore, could lead to increased harm to human health and the environment. In addition, commenters argued that if used oil were listed as hazardous waste, generators, transporters, collectors, processors, and users of the used oil would become subject to Superfund liability which would further discourage the recycling of used oil (i.e., joint and several liability and increased insurance cost).[477]

In response to the public hearing comments and approximately 600 written comments, the vast majority of which expressed similar criticisms of the proposal to list used oil as a hazardous waste,[478] the EPA on March 10, 1986, published a "Notice of data

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Notice of data availability and request for comments.), at 8206. The public hearings were held in Dallas, Texas; San Francisco, California; and Washington D.C. on January 8,10, and 16, respectively, to discuss the used oil rules which were proposed on November 29, 1985.

[476] Id.

[477] Id.; also note that in this "Notice of data availability and request for comments" on the issues raised by the commenters, the EPA in response to the issue of Superfund liability expressed its opinion that this argument was probably not a valid one and instead just a perception problem since "even if used oil were not listed as a hazardous waste, but contained hazardous substances at levels exceeding those normally found in petroleum, the used oil would be (and currently is) subject to Superfund liability."

[478] See "Public Comment Analysis for the Listing of Used Oil and

availability and request for comments" and invited "the public to further comment and provide specific documentation on the issue of whether or not, and to what extent, listing used oil as a hazardous waste when recycled will have a discouraging effect on used oil recycling activities."[479] The Agency specifically requested comments and data on the following points:

> (1) the regulatory option of listing used oil as a hazardous waste only when disposed, but retaining the proposed management standards for used oil that is recycled.
>
> (2) Will insurance costs increase if recycled used oil is listed as hazardous waste?
>
> (3) How do generators, transporters, processors, and burners perceive potential liabilities from used oi mismanagement?
>
> (4) If recycled used oil is listed as a hazardous waste, to what extent will burners stop using it and use some other fuel?

Management Standards for Recycled Oil," supra note 18; the EPA in its November 19, 1986, "Decision not to adopt proposed rule," 50 FR 41900, summarized these comments by stating "The ultimate thrust of the negative comments was that the listing would not only discourage used oil recycling, but would ultimately be environmentally counterproductive because used oil left unrecycled would be disposed of in manners posing greater risk than recycling. Additionally, although many commenters supported, in general, the need for regulation of used oil (including management standards for recycled oil), some commenters indicated that certain of the proposed management standards would also discourage recycling. Particular negative factors singled out by commenters were the stagmatizing effect of a listing, and strict regulation of burners who have an easily-available virgin fuel substitute."

[479] 50 FR 8206 (March 10, 1986) at 8206.

(5) If recycled used oil is listed as a hazardous waste, what impact will it have on service stations, oil change stations, and retailers who perform oil changes? Are there data to indicate what percentage of oil change service operators will become unwilling to accept DIY used oil?[480]

The Agency also requested additional information on the experiences of the approximately 12 states currently listing used oil as a hazardous waste or subjecting it to special management standards.[481] In particular the EPA wanted further information on the following issues:

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[480] Id. at 8206-7.

[481] The EPA already was in possession of at least three studies of state experiences with listing used oil as a hazardous waste or subjecting it to special management standards. These studies included: (1) the Radian Corporation's 14 February 1986, (Revised) Technical Memorandum submitted to the U.S. EPA, OSW, Listing Program, entitled "State Survey on the Impact of Used Oil Regulations" which analyzed the impacts of the subject actions in eight states which have specific regulations listing used oil as a hazardous waste under certain circumstances (these states are California, Massachusetts, Missouri, New Jersey, New York, Oklahoma, South Carolina, and Vermont) and in the four states which consider used oil a special waste (Delaware, Illinois, Michigan, and Texas); (2) a Franklin Associates' Memorandum dated January 3, 1985, and entitled "Impacts of State Used Oil Regulation" which presented the results of an analysis of three states with used oil regulations currently in place, including California, Missouri, and Kansas; and (3) a "Regulatory Analysis" prepared by the U.S. EPA Office of Policy Analysis dated January 30, 1985, and entitled "Waste Oil: Overview of State Programs" which presented an analysis of the programs in the states of New Jersey, New York, Alabama, Maryland, Michigan, Nevada, Oregon, Pennsylvania, and Virginia.

> What impact have these rules had on the recycling of used oil in these states? In particular, has there been a significant change in the quantity of used oil managed in the recycled oil system? How has the recycling of DIY used oil been affected by these rules? Have the used oil regulations in these states affected liabilities and insurance rates?[482]

The EPA also expressed concern and invited comment on the administrative problems associated with not listing used oil as a hazardous waste when recycled under section 3014(b) and instead promulgating the proposed special management standards for recycled used oil under authority of section 3014(a). The areas of concern, on March 10, 1986,[483] included the following administrative matters: (1) section 3014(a) does not explicitly provide for delegation of a regulatory program to States under the established 40 CFR Part 271 authorization procedures; (2) EPA's criminal enforcement under section 3008(d) and (e) would be limited; and (3) if used oil were not listed as a hazardous waste, there would be no delisting mechanism in these proposed management standards that would be available to generators who feel that their wastes do not contain significant levels of toxic constituents and, therefore, should not be subject to the special management standards for recycled used oil.[484]

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[482] 51 FR 8206 (March 10, 1986) at 8207.

[483] As will be discussed shortly, several of these areas of concern were to be remedied by Congressional action in the near future with the enactment of the Superfund Amendments and Reauthorization Act of 1986, P.L. 99-499, 100 Stat. 1613 (1986).

[484] See 51 FR 8206 (March 10, 1986) at 8207.

(c) EPA's 1986 Final Decision Not to List Recycled Oil as Hazardous

Within a relatively brief period of time following the Agency's November 1985 and March 1986 notices, there were a number of developments relevant to the EPA's ultimate action on these proposals.

First, the public response to the two original proposals and the subsequent request for additional comment produced a deluge of approximately 850 public comments with the vast majority heavily criticizing the Agency's proposal to list recycled used oil as a hazardous waste under RCRA.[485] The EPA found the central theme of the commenters' lines of reasoning to be that a successful national used oil recycling system depends on "voluntary" participation of private parties at certain crucial points, and that a recycled oil listing would seriously deter this participation.[486]

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[485] See, "Public Comment Analysis for the Listing of Used Oil and Management Standards for Recycled Oil" supra note 18; also see, 50 FR 41900 (November 19, 1986) at 41902 for the Agency's summary of these comments which includes the following concerns: "[T]he most common comment was that listing recycled oil would disrupt established collection and recycling networks and ultimately lead to improper used oil disposal. EPA is particularly impressed by the broad range of parties who expressed this concern [generators and recyclers of used oil, private groups and State and local governments who have set up do-it-yourself (DIY) collection centers and who claimed that a listing would impair or put an end to such efforts]."

[486] 51 FR 41900 (November 19, 1986) at 41902 which also notes that "Commenters cited concerns with CERCLA liability, with insurance rates, public and employee relations, and the 'derived-from' rule ...Parties whose participation was cited as likely to

Second, the Agency conducted investigations of some of the major issues raised in the public comments, including the effects of crude oil price drops on used oil recycling and the potential impacts of the "stigma" associated with a hazardous waste listing. This latter study was necessary at this point because in the initial proposal, the EPA did not evaluate the effects listing might have on used oil recycling, since it believed that any effects would result from imposition of management standards not listing; however, numerous commenters indicated that listing alone, apart from the imposition of standards, could seriously discourage recycling.[487]

The EPA also conducted an analysis of the issue of "oil

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cease were service stations and others who act as DIY collection centers, and industrial fuel users ...DIYs would have no place to take their used oil and would likely place it in their household garbage, down sewers, or dump it on the ground ...industrial fuel is the major use of used oil and given the nation's currently limited re-refining capacity (and the recent fall in oil prices), refusal of industrial burners to accept used oil fuels would cause 'backups' throughout collection networks and ultimately could lead to unsound disposal (by generators left without a recycling outlet)."

[487] 50 FR 49258 (November 29, 1985) at 49360; 51 FR 41900 (November 19, 1986) at 41902 notes that when the Agency examined the impact of its November 29, 1985, final rule for "Burning of Waste Fuel and Used Oil Fuel in Boilers and Industrial Furnaces" (50 FR 49164) it found that it had predicted that over 2,000 establishments would burn off-specification used oil as fuel, despite the listing of used oil as a hazardous waste and the regulation of used oil burners; however, through October 1986 only about 500 burner notifications had been received. The Agency concluded from the available data that although much of the disparity was likely due to the availability of low priced virgin fuel oils, burners' concerns over the proposed listing and certain of the proposed management standards also seem to have caused reluctance to purchase used oil fuels.

displacement" which showed that, even in the absence of substantive controls on recycled oil, the listing of recycled oil as a hazardous waste could cause an additional 61-128 million gallons per year of used oil to be disposed of in uncontrolled ways.[488] The Agency determined that the "costs and stigma" associated with listing recycled oil could significantly reduce the demand for used oil fuel, and that the re-refining facilities would not be able to expand in the short term to the extent necessary to absorb all of the used oil displaced from burning, which would result in a backup through much of the used oil management system.[489]

Third, while the Agency was evaluating the comments and the results of its additional analysis, Congress began to show increasing interest in the possible adverse effects of the proposals. The focus of this concern became the hearings on "Used and Recycled Oil: Pending EPA Rulemaking" before the House Subcommittee on Energy, Environment, and Safety Issues Affecting Small Business held on

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[488] 51 FR 41900 (November 19, 1986) at 41902 which states that "This disruption is attributable both to direct economic effects (e.g., costs of managing combustion residues as hazardous wastes) as well as psychological effects such as public relations problems, etc., which may translate into economic effects (e.g., the cost of an asphalt company hiring a community relations specialist to allow continued burning of used oil fuel)."

[489] Id. which states the results of this backup would be that: "Generators would then have difficulty in finding recyclers willing to accept their used oil; and as a result, commercial auto centers would likely refuse to accept DIY-generated used oil and significantly increase the price charged for oil change services offered to the public. Reduced availability of DIY oil collection centers and higher oil change price for the public would increase DIY oil changes and would ultimately lead to increased uncontrolled disposal of used oil."

May 19, 1986.[490] During these hearings state officials, service station owners and trade association representatives, used oil transporters, used oil processors, and the trade association of the asphalt plant industry indicated that listing recycled oil would be environmentally counterproductive due to adverse impacts that would result from such a listing. Dr. J. Winston Porter, Assistant Administrator for Solid Waste and Emergency Response, U.S. EPA, made a statement before the Committee which included the following considerations:

> Many factors have changed since the development of the RIA [Regulatory Impact Analysis]. Prices of all petroleum products have dropped significantly over the past several months. The price of "virgin" fuel oil has dropped dramatically, reducing the incentives to use waste-derived fuel. The price paid to generators of used oil has also recently been dropping. In addition, increasing insurance liability costs coupled with limited availability have contributed to the difficulties faced by the regulated community ....Many processors indicate that they cannot presently sell their reprocessed used oil fuel. Their fuel customers, mostly asphalt plants, are reluctant to accept the used oil fuel due to concerns of potential future regulatory involvement, increased insurance costs, and the stigma attached to hazardous wastes.[491]

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[490] H.R. Hearing, 99th Cong. 2d Sess., May 19, 1986, "Used and Recycled Oil: Pending Rulemaking," Hearing Before the Subcommittee on Energy, Environment, and Safety Issues Affecting Small Business of the Committee on Small Business.

[491] Id., at pages 5-6 of the statement of Dr. J. Winston Porter, Assistant Administrator for Solid Waste and Emergency Response, U.S. EPA.

Forth, several of the administrative concerns expressed earlier by the Agency[492] were remedied by Congress in the Superfund Amendments and Reauthorization Act of 1986 (hereafter SARA).[493] These concerns had centered on the option of regulating recycled oil under section 3014(a) without identifying or listing it as a hazardous waste under 3014(b). EPA felt that regulations issued under this option would be difficult to implement effectively because it would lack full RCRA State authorization and criminal enforcement authorities.[494] Congress under SARA amended RCRA to remedy some of these concerns by providing state authorization and criminal enforcement authorities for recycled oil not listed as a hazardous waste.[495]

Fifth, as the Agency completed its analysis of the field studies in states where used oil had been listed as a hazardous waste under State law, it concluded that the reason that there had not been drastic adverse environmental consequences in these States was that most of the used oil produced in these States was shipped from them into States where used oil was not regulated.[496] Such an

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[492] See, supra note 484, and accompanying text.

[493] P.L. 99-499, 100 Stat. 1613 (1986).

[494] See, supra note 484, and accompanying text; and 51 FR 41900 (November 19, 1986) at 41903.

[495] 42 U.S.C. sections 6928 and 6929, P.L. 99-499, 100 Stat. 1703 (1986), (RCRA sections 3006 and 3008 were amended by section 205(i) of SARA to provide this authority). Also note 42 U.S.C. section 9614, P.L. 99-499, 100 Stat. 1662 (1986) in which Congress provided a limited exclusion for liability from CERCLA liability for certain generators of recycled oil.

[496] 51 FR 41900 (November 19, 1986) at 41901; see also, the studies

option would not be available should used oil be regulated at the federal level.

Based upon this record EPA, on November 19, 1986, promulgated its final decision: (1) not to list used oil that is recycled as a hazardous waste; (2) to defer a decision on the listing of used oil that is disposed of until 1988-89; and (3) to postpone issuing management standards for recycled oil pending additional studies.[497]

The Agency provided the following rationale for the decision not to list used oil that is being recycled as a hazardous waste:

> EPA is meeting part of its statutory deadline of determining whether to list used oil by deciding not to list used oil being recycled, or being sent for recycling, as a hazardous waste. We have determined that listing recycled oil would discourage recycling of used oil. Our further concern is that displacement of this used oil from recycling could cause an increased quantity of used oil to be disposed of in uncontrolled ways, causing harm to the environment. This increased disposal could result from decreased use of used oil as fuel by industrial burners and decreased acceptance of do-it-yourselfer oil by service stations (and similar establishments), both attributable to costs and stigma associated with listing.
>
> Balanced against the environmental harm likely to be associated with listing recycled oil is the fact that EPA can regulate used oil recycling without a listing. The

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listed at, supra note 481, and "Assessment of State Used Oil Management Practices and Regulations," Vol I, prepared by Versar Inc., Franklin Associates, and Jacobs Engineering Group for the Office of Solid Waste U.S. EPA, June 9, 1986.

[497] 51 FR 41900 (November 19, 1986), "Identification and Listing of Hazardous Waste; Used Oil," (Action: Decision not to adopt proposed rule; tentative schedule to address issues still outstanding.).

> quantity of used oil in question, absent the listing, would most likely be burned. Burning of used oil is now partially controlled under a combination of RCRA and the Clean Air Act regulations, and EPA is conducting studies to determine what additional controls, if any, are necessary to adequately protect human health and the environment from the hazards associated with used oil burning. Listing recycled oil as a hazardous waste, however, is not necessary to promulgate additional rules for recycled oil. Therefore, we have concluded that the listing would discourage recycling, and since listing is not necessary to regulation, have further concluded that listing could pose a net detriment to the environment.[498] [emphasis added]

The Agency's decision raises the legal issue of whether a decision not to list a waste as hazardous under RCRA Subtitle C can be based exclusively upon non-technical grounds.[499] This issue is particularly important since the Agency specifically stated that its "decision today is not based on the hazards of recycled oil [but rather on the belief] that listing would discourage recycling of used oil and could have and environmentally counterproductive effect."[500]

The Agency realized that basing a decision not to list recycled

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[498] Id. at 41901; also note that EPA maintains in this notice, at 41900, that section 3014 "carves out a special niche for recycled oil in Subtitle C that differs from all other wastes. Recycled oil is to be regulated under a special set of rules, effects on recycling must be taken into account in listing and regulating recycled oil, and EPA retains authority to regulate recycled oil under Subtitle C whether or not it is identified or listed as hazardous."

[499] The Agency was subsequently sued, primarily on this issue, by the Hazardous Waste Treatment Council. This suit will be discussed at the end of this subsection.

[500] 51 FR 41900 (November 19, 1986) at 41901.

oil as hazardous on the grounds that such a listing could discourage its recycling and could have an environmentally counterproductive effect was a significant departure from its past decisions in this area, which were based purely on a technical determination of whether the waste under consideration satisfied the criteria for listing contained in 40 CFR section 261.11(a), which implements RCRA section 3001.[501] In making this decision the EPA expressed its belief that section 8 of the UORA specifically allows for consideration of the effects of listing on recycling of used oil when the statute states that in determining whether or not to list used oil as a hazardous waste, "the Administrator shall ensure that the recovery and reuse of used oil are not discouraged." The Agency notes that this provision was left unamended in the 1984 Amendments, which to the EPA indicates that Congress intended to continue to require the consideration of these non-technical factors, to the extent they bear on recycling of used oil, in a determination whether to list recycled oil.[502] The EPA also believes that since recycled oil is the only type of waste for which Congress has expressly provided authority for regulation under Subtitle C, whether or not it is identified or listed as a hazardous waste, indicates the Congressional intent that a decision for the listing of recycled oil is more discretionary than other listing decisions; thus, the Agency "can legitimately consider such non-technical factors as the effect on recycling and ultimate environmental effect of a listing determination."[503]

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[501] Id.

[502] Id.

[503] Id.

In the same November 19, 1986 notice in which the Agency issued its decision not to list used oil being recycled, the EPA also deferred a decision on the listing of used oil that is disposed of until mid-1988 or 1989, depending upon the choice of a statutory approach for the regulation, and postponed issuing management standards for recycled oil pending additional studies.[504]

The Agency noted that it continues to believe that improper disposal of used oil can cause serious environmental problems; however, it also believes that some options not previously evaluated may achieve better environmental results as compared to the proposed RCRA hazardous waste listing.[505] In particular the EPA is investigating whether disposal of used oil can be controlled under section 6 of the Toxic Substances Control Act (TSCA),[506] because the Agency believes that this approach may have advantages when compared to RCRA listing.[507] Section 6(a)(6)(A) of TSCA provides authority for the Administrator to prohibit or otherwise regulate forms of disposal of a chemical substance or mixture that "present an unreasonable risk of injury to health or the environment."[508] The Agency is interested in options of this nature because it feels that no matter how it attempts to differentiate under RCRA between listed used oil which is disposed of and unlisted used oil being

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[504] Id. at 41903 and 41904.

[505] Id. at 41903.

[506] 15 U.S.C.A. section 2601 et seq., P.L. 94-469, October 11, 1976, as amended by P.L. 97-129, December 29, 1981; P.L. 98-620, November 8, 1984; and P.L. 99-519, October 22 1986.

[507] 51 FR 41900 (November 19, 1986) at 41903.

[508] 15 U.S.C. section 2605.

recycled the distinction will be lost on some, and used oil will simply be considered "hazardous" for all practical purposes.[509]

In the discussion of the EPA's decision to postpone issuing management standards for recycled oil, the Agency noted that standards in addition to those issued in final form on November 29, 1985,[510] were necessary, because while the issued standards do address some of the more serious problems, they do not by themselves provide adequate controls to ensure proper used oil recycling. In particular, these standards do not address road oiling, storage and facility management (e.g., security provisions, financial arrangements for closure, etc.), and do not address actual emissions from industrial burning of off-specification used oil fuel.[511]

The Agency felt that at the time of the notice it could not further address the issue of management standards because it lacked adequate data to evaluate comments to the effect that some aspects of the proposed standards may have been so stringent as to cause impacts similar to a recycled oil listing.[512] In addition, the

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[509] 51 FR 41900 (November 19, 1986) at 41903.

[510] 50 FR 49164. "Hazardous Waste Management System; Burning of Waste Fuel and Used Oil Fuel in Boilers and Industrial Furnaces," (Action: Final rule.).

[511] 51 FR 41900 at 41903.

[512] Id., and at 41904 the Agency notes that commenters (mainly used oil processors and used oil burners), in particular, maintained that EPA's proposal to apply full RCRA facility standards to burners would virtually eliminate used oil burning as a recycling outlet. EPA's preliminary cost analyses appeared to confirm this claim. The Agency was very concerned about this result since burning is the major end use of used oil. Therefore the EPA stated that it was re-evaluating its approach to regulating used oil burners to determine "whether a reduced set of facility standards might be adequate, whether requirements might be phased-in over a period of time, and

EPA noted that it was not issuing final management standards at this time because it was reluctant to regulate recycling any further until the Agency's overall used oil strategy becomes more fully developed (e.g., it wanted to avoid piecemeal regulation so as not to create an incentive to dispose).[513]

EPA concluded its decision not to list used oil being recycled as a hazardous waste, the associated deferral of a listing of used oil that is disposed of, and the postponement of issuing management standards for recycled oil with the following "New Schedule":

> EPA has formulated two schedules. The first would involve the use of TSCA in lieu of a RCRA disposal listing, and the second would involve a RCRA listing for disposal.
>
> TSCA and RCRA Approach
>
> Decision as to whether TSCA will be used--Early 1987.
> Proposed TSCA disposal controls--Late 1987.
> Proposed (RCRA) combustion controls--Late 1987.
> Final TSCA disposal controls, RCRA management standards and combustion controls--Mid 1989.
>
> RCRA-Only Approach
>
> Decision as to whether TSCA will be used--Early 1987.

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also to determine to what extent RCRA used oil emission standards can be coordinated with standards issued by the Agency under the Clean Air Act for fossil fuel burners." The EPA also noted that the latter aspect of this "re-evaluation might result in similar regulations for 'virgin' and used oils, and this might reduce industrial fuel users' hesitancy to purchase a 'waste' or 'used' oil fuel."

[513] Id. at 41904.

Notice of any new RCRA listing data--Late 1987.
Final used oil (disposal) listing and management standards--Mid 1988.
Proposed combustion controls--Mid 1988.
Final combustion controls--Mid 1989.[514]

Little work of any real significance has been accomplished by the Agency toward achieving any of these targets. Much of the delay can be attributed to a law suit filed by the Hazardous Waste Treatment Council against the EPA after the Agency issued the notice and its associated decisions not to list used oil being recycled as a hazardous waste. The suit was filed in the United States Court of Appeals for the District of Columbia Circuit, with oral arguments heard on March 9, 1988.[515]

The petitioners, Hazardous Waste Treatment Council, et al., provided the following "Statement of the Issues" in their February 26, 1988, brief for this suit:

> 1. Whether the Environmental Protection Agency's ("EPA's") determination not to list certain used oil as a hazardous waste under Section 3001 of the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. Section 6921, *after specifically concluding* that used oil meets the criteria for listing under Section 3001, is arbitrary, capricious, and contrary to the express direction of Section 3014(b) of RCRA, 42, U.S.C. Section 6935(b), which directed EPA to determine "whether to list or identify used automobile and truck crankcase oil

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[514] Id.

[515] Hazardous Waste Treatment Council, et al., v. U.S. Environmental Protection Agency and Lee M. Thomas, Administrator, No. 86-1658 (U.S. Court of Appeals for the District of Columbia Circuit, 1988). As of September 1, 1988, the Court had not published a decision.

and other used oil as hazardous waste under section 3001" by November 1986, where the sole reason given by EPA for its failure to list used oil is a concern over the "stigma" that may attach to such a listing?

2. Whether EPA's failure to list certain used oil as a hazardous waste in compliance with RCRA Section 3014(b) has resulted in non-compliance with the requirements of RCRA Sections 3014(c) and (d) to establish appropriate management standards for used oil that is hazardous waste and is recycled.[516]

In response to these issues the Agency provided the following arguments:

EPA properly interpreted section 3014(b) of RCRA as permitting it to consider whether the listing of recycled oil as a hazardous waste would harm human health and the environment and discourage the recycling of used oil. Section 3014(b), interpreted in light of its policies and purposes and section 8 of UORA, allows EPA to consider the effects of listing on the environment and recycling. Moreover, it is proper for EPA to consider these effects as an "appropriate" criterion for listing under RCRA section 3001(a).

Even assuming that petitioners are correct on the merits, they are requesting improper relief. First, this Court cannot order EPA to list recycled oil as a hazardous waste under the technical criteria for listing. The question as to whether recycled oil is hazardous involves disputed issues of fact on which there has been no final

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[516] Petitioners' Joint Brief at pages 1 and 2, Hazardous Waste Treatment Council, et al., v. U.S. Environmental Protection Agency and Lee M. Thomas, Administrator, No. 86-1658 (U.S. Court of Appeals for the District of Columbia Circuit, 1988). The petitioners filing this Joint Brief included the Hazardous Waste Treatment Council, the Association of Petroleum Re-refiners, and the Natural Resources Defense Council.

Agency action. Second, this Court has no jurisdiction to order the Agency to issue management standards for recycled oil. Such jurisdiction lies exclusively in federal district courts under RCRA section 7002(a).[517]

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[517] Respondents' Brief at page 17, Hazardous Waste Treatment Council, et al., v. U.S. Environmental Protection Agency and Lee M. Thomas, Administrator, No. 86-1658 (U.S. Court of Appeals for the District of Columbia Circuit, 1988).

VII. CONCLUSION

The EPA determined in its 1981 Report to Congress that used automotive and industrial oils should be listed as hazardous wastes.[518] The rational step following this determination was taken when the Agency proposed a rule in 1985 to amend the regulations for hazardous waste management under Subtitle C of RCRA, by listing used oil as a hazardous waste.[519] The stated reason behind this proposal was that used oil typically contains constituents that pose a substantial hazard to human health and the environment.[520] These and numerous other studies and reports, including the findings of Congress in the UORA,[521] leave little doubt as to the dangers to public health and the environment associated with the improper re-use and disposal of used oil.[522] These dangers are magnified by the pervasiveness of used oil, from both industrial and automotive sources, in the environment.[523]

Despite the recognized and documented dangers associated with used oil re-use and disposal, the EPA chose in its 1986 final

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[518] U.S. EPA, Report to Congress, "Listing Waste Oil as a Hazardous Waste," supra note 10, at pages 76-78. See, supra notes 387 and 388, and accompanying text.

[519] 50 FR 49258 (November 29, 1985), "Hazardous Waste Management System; General; Identification and Listing of Hazardous Waste; Used Oil," (Action: Proposed rule.).

[520] Id. at 49258.

[521] 42 U.S.C. section 6901(a).

[522] See Chapters III and IV.

[523] See Chapters II and IV.

decision: (1) not to list recycled oil as hazardous; (2) to defer a decision on the listing of used oil that is being disposed; and (3) to postpone issuing management standards for recycled oil.[524] The primary basis of the rationale for the decision not to list recycled used oil was EPA's conclusion that "listing would discourage recycling, and since listing is not necessary to regulation, [the further conclusion] that listing could pose a net detriment to the environment."[525] This conclusion came from the realization by the Agency that a successful national used oil recycling system depends on "voluntary" participation of private parties at certain crucial points in the U.O.M.S., and that listing recycled oil would seriously deter this participation.[526]

The EPA was thus stuck between the proverbial "rock and a hard place." The hazards to public health and the environment of recycled and disposed used oil clearly justified their listing as hazardous wastes; however, the "stigma" associated with the listing threatened to destroy much of the "voluntary" system necessary for any program which would accomplish the goal of providing the desired protection. The "voluntary" aspect of the system is particularly important since almost 20 percent of all used oil generated comes from do-it-yourself oil changers (DIYers).[527]

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[524] 51 FR 41900 (November 19, 1986), "Identification and Listing of Hazardous Waste; Used Oil," (Action: Decision not to adopt proposed rule; tentative schedule to address issues still outstanding.).

[525] Id. at 41901. See, supra note 498, and accompanying text.

[526] 51 FR 41900.

[527] See, supra note 69, and accompanying text. Also see Chapter II(d) "The Sources of Used Oil in the United States."

Federal regulation would be impossible to enforce against potentially tens of millions of DIYers who dispose of their used oil down local sewers, with the solid waste pickup, and through a variety of other imaginative methods. In addition, the utilization of used oil derived fuels by a variety of users is also voluntary since these burners can easily switch to virgin fuels should the burdens associated with burning used oil become too great.[528] During times of low virgin oil prices the point at which these burdens force the cessation of used oil recycling activities is easily reached.

Fortunately for the EPA, which is charged with protecting the public health and the environment from the hazards associated with used oil, Congress has provided alternate methods of dealing with the interrelated problems of providing the desired protection and maintaining the flow of used oil in the recycling network. The two most promising options are: (1) the regulation of recycled used oil under Subtitle C without listing it as a hazardous waste, while controlling disposal by listing used oil which is disposed of as a hazardous waste;[529] and (2) the regulation of recycled used oil under Subtitle C without listing it as a hazardous waste, combined with the use of section 6 of TSCA to control the disposal of used oil.[530]

The Agency has realized through its past mistakes that equally important to the final method of control are: (1) the sequence in

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[528]See, supra note 491, and accompanying text.

[529]See, supra notes 502 and 503, and accompanying text. See also 51 FR 41900 at 41904.

[530]See, supra notes 506-508, and 514 and accompanying text. See also 51 FR 41900 at 41904.

which it accomplishes the required actions;[531] and (2) the public relations efforts which must be made an integral part of any regulatory action affecting the sensitive recycled oil market.[532]

The Agency is duly concerned about the effects of issuing recycled oil management standards, since they can easily cause impacts in the used oil burner market similar to a recycled oil listing.[533] As a possible solution to the concerns of recycled oil management standards, the EPA is re-evaluating its approach to regulating used oil burners, including a consideration as to what extent RCRA used oil emissions standards can be coordinated with

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[531] See, supra note 513, and accompanying text.

[532] In response the the extreme fear and negative reaction of the various elements of the U.O.M.S. generated by the EPA's first regulatory and listing efforts for used oil, the Agency issued two public releases in an effort to prevent additional damage to the recycling network. The first release which was entitled "Information Bulletin for Public Release: EPA Concerns About the Used Oil Recycling System," issued June 13, 1986, made the following opening statement, "The Environmental Protection Agency (EPA) is becoming increasingly concerned about disruptions in the used oil recycling system than are occurring because of the fall in virgin fuel oil prices and because of misunderstanding and confusion about EPA's regulations." The release then outlined the current status of EPA's used oil regulatory efforts and discussed the problems caused by the misunderstandings surrounding these efforts. The Agency also expressed its concerns that these rumors had caused many industrial burners to stop burning used oil, and emphasized that "Used oil is not now a Federally-listed hazardous waste [emphasis in original text]." The second release was made in August 1986 and was entitled "Information on Used Oil Recycling for Gas Stations and Other Vehicle Service Facilities." This release expressed similar concerns targeted at specific facilities and stated, "EPA hopes that you will continue to have your used oil (and used oil that you accept from homeowners) picked up and recycled."

[533] See, supra note 512, and accompanying text.

standards issued by the Agency under the Clean Air Act for fossil fuel burners.[534] The EPA has suggested that this process might result in similar regulations for virgin and used oils, which could help reduce industrial fuel users' hesitancy to purchase a used oil fuel.[535] This approach makes good sense in light of the fact that often the difference in the hazards imposed by virgin fuel (especially coal)[536] and used oil is slight; however, although the differences are slight the hazards associated with both can be significant.[537]

The current problem for achieving any form of acceptable regulatory action is the recent six hundred and sixty thousand dollar cut in funds for the used oil program, leaving the fiscal year 1988 funding at two hundred thousand dollars.[538] This makes major new initiatives to control used oil unlikely for the immediate future.

As discussed above, the dangers of improper used oil recycling and disposal constitute a significant threat to the public health and the environment, while the proper recycling of used oil can be a valuable source of energy and material. The used oil recycling industry has survived many serious threats to its existence; however, one of the most damaging federal actions to this fragile system has been the combination of the recent proposals and subsequent indecision by the EPA on used oil regulation. It is ironic

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[534] Id.

[535] Id.

[536] See, supra note 291, and accompanying text.

[537] See Chapter III(a) and IV(a) of this thesis.

[538] Inside EPA, Vol. 9, No. 6, February 12, 1988, at page 16.

that this industry, which can contribute so much to a successful program to accomplish the goals of Congress of protecting the public health and the environment from the hazards of used oil while reaping the benefits of used oil recycling, is in constant battle with the federal agency which has the identical goal.

It is important for the EPA to accomplish the goal of protecting the public health and the environment from the hazards of used oil recycling and disposal through well planned and designed regulations; however, the process of accomplishing this goal, if not properly carried out, can destroy the very industry upon which any successful federal program for the regulation of used oil must depend. When dealing with a system as fragile and valuable to the United States as the used oil recycling industry is, no action is a better course to follow than the poorly planned and designed federal efforts which have plagued this valuable industry for over half a century.

TABLE 1

CONCENTRATION OF POTENTIALLY HAZARDOUS CONSTITUENTS IN USED OIL, 1983[a]

Contaminant	Total Samples Analyzed	Samples With Detected Contaminants		Mean Concentration[a] ppm	Median Concentration[b] ppm	Concentration at 75th Percentile[b,c] ppm	Concentration at 90th Percentile[b,c] ppm	Concentration Range ppm	
		Number	%					Low	High
Metals									
Arsenic	537	135	25	17.26	5	5	18	<0.01	100
Barium	752	675	89	131.92	48	120	251	0	3,906
Cadmium	744	271	36	3.11	3	8	10	0	57
Chromium	756	592	78	27.97	6.5	12	35	0	690
Lead	835	760	91	664.50	240	740	1,200	0	21,700
Zinc	810	799	98	580.28	480	872	1,130	<0.5	8,610
Chlorinated Solvents									
Dichlorodifluoromethane	87	51	58	373.27	20	160	640	<1	2,200
Trichlorotrifluoroethane	28	17	60	62,935.88	160	1,300	100,000	<20	550,000
1,1,1-Trichloroethane	616	388	62	2,800.41	200	1,300	3,500	<1	110,000
Trichloroethylene	608	259	42	1,387.63	100	200	800	<1	40,000
Tetrachloroethylene	599	352	58	1,420.89	106	600	1,600	<1	32,000
Total Chlorine	590	568	96	4,995.00	1,600	4,000	9,500	40	86,700
Other Organics									
Benzene	236	118	50	961.20	20	110	300	<1	55,000
Toluene	242	198	81	2,200.48	380	1,400	4,500	<1	55,000
Xylenes	235	194	82	3,385.54	550	1,400	3,200	<1	139,000
Benz(a)anthracene	27	20	74	71.30	12	30	40	<5	660
Benzo(a)pyrene	65	38	58	24.55	10	12	16	<1	405
Naphthalene	25	25	100	475.20	330	560	800	110	1,400
PCBs	753	142	18	108.51	5	15	50	0	3,800

[a] Results determined from the analyses of 1,071 used oil samples.
[b] Calculated for detected concentrations only.
[c] For the purposes of determining mean and percentile concentrations, undetected levels were assumed to be equal to the detection limit.

Source: Franklin Associates Ltd., "Composition and Management of Used Oil Generated in the United States," Report No. PB85-180297, for the U.S. Environmental Protection Agency, Washington, D.C., November 1985, at section 1, page 12 (table 2).

Appendix A

TABLE 2

SUMMARY OF THE PRESENCE OF SOME FREQUENTLY DETECTED PRIORITY POLLUTANTS IN USED OIL

Pollutant	Number Detected[a]	Percent Detected	Mean (ppm)[b]	Range (ppm)
Naphthalene	33	67	644	ND[c] to 2,480
Phenanthrene	35	71	252	ND to 2,080
Pyrene	10	20	141	ND to 470
Fluorene	19	39	167	ND to 530
2-Methylnaph-Thalene	33	67	937	ND to 2,700

[a]Out of 49 samples; does not include "trace" levels.

[b]Calculated for detected levels only.

[c]ND - not detected at 50 ppm detection level.

Source: Franklin Associates Ltd., "Composition and Management of Used Oil Generated in the United States," Report No. PB85-180297, for the U.S. Environmental Protection Agency, Washington, D.C., November 1985, at section 1, page 19 (table 4).

TABLE 3

SUMMARY OF MISCELLANEOUS PHYSICAL CHARACTERISTICS OF WASTE OIL SAMPLES

	Number of Samples	Range Low	Range High	Mean	Median
Flash point (F^{o})	289	62	555	210	-
Bottom sediment and water (%)	320	0	99	19	9
Water only (%)	36	0	67	11	5
Viscosity (CS at 100 ^{o}F)[a]	70	1	513	71	47
API gravity (^{o}API)[b]	48	13	80	28[c]	27
Energy content (Btu/gal)	231	4,142	23,045	16,495	17,200

[a] CS = centistokes; viscosity is often reported in SUS units also with the conversion to centistokes equal to:

Centistokes = [(0.00226 x SUS) - (1.95/SUS)] x 100

[b] API Gravity is a unit often used to illustrate the density of oil. It can be converted into specific gravity by means of the following equation:

Specific Gravity = 141.5/(131.5 + ^{o}API)

[c] The mean API Gravity of 28 is equal to a specific gravity of 0.89.

Source: Franklin Associates Ltd., "Composition and Management of Used Oil Generated in the United States," Report No. PB85-180297, November 1985, at section 3, page 54 (table 27).

TABLE 4

SUMMARY OF FLASHPOINT FOR USED OIL SAMPLES BY OIL SOURCE AND END-USE

	Total samples analyzed	Number of samples with flashpoint <140°F	Mean temperature* (°F)	Temperature Range* Low	high
By Source of Oil:					
Crankcase oil	77	7	276	<70	440
Industrial oil	106	7	273	80	525
Unk generator	311	66	146	60	450
All samples	289	80	210	60	525
By End-Use Application:					
Road oiling	18	11	121	72	165
Burning	51	28	146	60	284
Re-refiner	34	10	271	<80	480
Unknown	113	31	230	62	525

* Calculated for detected flashpoints only.

Source: Franklin Associates Ltd., "Composition and Management of Used Oil Generated in the United States," Report No. PB85-180297, for the U.S. Environmental Protection Agency, Washington, D.C., November 1985, at section 3, page 56 (table 28).

TABLE 5

END-USES OF USED OIL, 1983[a]

End-use/Disposal	Used Oil Flowing Through Management System		Used Oil Not Entering Management System[b]		Total Generated Used Oil	
	Million Gal	%	Million Gal	%	Million Gal	%
Re-refined lube oil	62.7	9.4	--	--	62.7	5.2
Onsite recycling	--	--	44.0[d]	8.2	44.0	3.6
Non-fuel industrial[c]	34.9	5.2	0.0	0.0	34.9	2.9
Burning	489.8	73.2	100.3[e]	18.7	590.1	48.9
Road oiling	39.6	5.9	28.9	5.4	68.5	5.7
Disposal/Dumping	42.1	6.3	363.8	67.7	405.9	33.7
Grand Total	669.1	100.0	537.0	100.0	1,206.1	100.0

[a] All volumes represent oil with consumed additives. Solid and liquid contaminants (including water) are not included in quantities.

[b] Includes used oil which is managed entirely by the generator either through reuse or disposal.

[c] Includes flotation oils in phosphate industry and asphalt extenders.

[d] Reuse of lubricants by industry may use sophisticated re-refining technologies or simpler processor technologies.

[e] Of this amount, eight million gallons were burned by DIYers in various ways, but primarily blended with home heating oil.

Source: Franklin Associates Ltd., "Composition and Management of Used Oil Generated in the United States," Report No. PB85-180297, November 1985, at section 5, page 2 (table 45).